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JOURNAL OF EDUCATIONAL RESEARCH

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JOURNAL *of* EDUCATIONAL RESEARCH

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THE RELATION OF PHILOSOPHY AND SCIENCE IN EDUCATION[1]

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IT would seem fair at the outset to suggest that, whereas philosophy has a reputation in education to live down, science has a reputation to live up to. Both tasks are difficult. Philosophy was inherited as a discipline to be reverenced, but education, acting much in the manner of the younger generation, refuses to respect it on the sole ground of its age. On this score science has a distinct advantage. Its youthfulness breeds enthusiasms, and education, again in the manner of the younger generation, recognizing an earthy and kindred spirit, bids it welcome.

The existing attitudes toward these respective disciplines are readily understood. Philosophy has lost friends in proportion as it turned its face from the pressing and immediate problems of everyday life to *the* problem of discovering ultimate truth and reality. Science, conversely, has gained adherents for the reason that it made these mundane problems its own. On the one hand, therefore, education has looked into an expectant and eager face; on the other, it has gazed upon a haughty and disinterested back. It is no mystery that science is in the ascendancy in education.

It is clear, I believe, that philosophy of this character bears no relation to science in education, unless it be that of a spinster aunt who views with disgust the scarlet lips and rolled hose of a daring niece. If we can give no other character to philosophy, then we might better strike our tents and view our topic as one of those interesting problems belonging to a period when man fashed himself unduly, because he failed to realize that some questions should never be raised.

We may admit that philosophy has an unsavory reputation and still offer the suggestion, though it may take some temerity to do so, that

[1] Read before the May meeting of the Ohio State Statistical Club; one of five papers in a symposium addressed to the topic, "Modern Trends in Education."

this is the fault of philosophers rather than of philosophy. We need, first of all, to disabuse our minds of the belief that science deals solely with facts, whereas philosophy treats only of fancy. When philosophy does not originate in and get its bearings from a teeming, swirling world, it is the construction of an imagination that possesses no content on which to base its images. Philosophy, like science, is but a special way of handling facts, and to conceive it as a discipline that must be developed apart from facts, is quite as absurd as it would be to imagine a science that searched for facts, as one does for oysters, with no interest in the relation that they bear to each other and to the science as a whole.

Both science and philosophy deal with facts, but the manner of dealing is different. Science is interested in facts, for through them it is enabled to get more facts (and in the light of the present energy that is put into scientific developments, we may safely add, "and still more facts"). The significant point is this: science has just one interest in its datum, the way in which it may be used to move forward and backward, in extending, or explaining its total system of data. The interest is in the prediction of further facts or, and it is at this point that the system looms as of utmost importance, in being able to account for facts that are accidentally hit upon.

When thus approached, one of the distinguishing characteristics of science is thrown into relief. Facts are not to be had for the asking—they are not the result of prayer. They are discovered only by virtue of deliberate search, (this is not to deny that facts may not be stumbled upon, it is but to insist that stumbling is not the method of science). Science, having the establishment of proof as its central function, has developed special techniques for the gathering of evidence—techniques that magnify the senses in order that man may go back-stage in the play of the universe, and which make possible procedures that safeguard the inferences which direct his exploration into the unknown.

The suggestion is put forward here that science is peculiarly the discipline of techniques that have as their special task the location of facts which will serve as evidence to further a particular system of knowledge within a given field. On this score, it is clearly differentiated from philosophy. Philosophy, as James so aptly said, is just "an unusually obstinate attempt to think clearly." For this purpose it has developed no similar techniques. Like science, it must possess a factual basis. Like science, it is a special integration of knowledge. Science,

unlike philosophy, however, has brought to play a whole battery of instruments to advance its grasp of facts, and to further its establishment of proof.

There is one other difference that we should make more explicit—namely, science and philosophy organize knowledge for differing purposes. And we may say in advance, it is at this point that we discover the significant relation of these disciplines in education. The extension of knowledge is the particular forte of science. Its organization is guided by its desire to predict further facts which will give it greater control over a given area of knowledge. Philosophy, on the other hand, integrates its knowledge for the specific purpose of integrating all knowledge. This may appear to be a hopeless task. From the scientific standpoint, it is just such a task, since in a world of change, where knowledge is in flux, a completed quantitative integration is impossible.

In the face of this fact the philosopher is, nevertheless, hopeful. His interest is in a way of life, and to this end he evaluates and orders the funded knowledge (and this is science) which curious and investigative minds have established. In other words, science gathers facts for the sheer love of facts, whereas philosophy handles them in the interest of a consistent, unified, life. The latter, in short, views knowledge in its relationship to conduct. Dewey states the relationship for which we are seeking most succinctly in these words:

"It is for the sciences to say what generalizations are tenable about the world and what they specifically are. But when we ask what *sort* of permanent disposition of action toward the world the scientific disclosures exact of us we are raising a philosophic question."[2]

I believe I have labored this point sufficiently to make the specific application to education relatively easy. If this relationship is granted, then it is evident at once that education is flirting with danger if she gives herself exclusively to philosophy or to science. The former will suggest that she live in a manner that is strictly fanciful; the latter will overwhelm her with factual presents but offer no suggestion of their value for a satisfying life. These extremes, to be sure, are seldom discovered, which is to say that the disciplines are already functioning together in some measure. What we need to insist upon, however, is that this functioning be made a conscious factor in the development of an educational program.

[2] Dewey, John. *Democracy and Education*, page 379.

The setting of a program is a philosophical problem; the means for its attainment, as well as the facts from which it gets its direction, are matters for the attention of science. Let me try to illustrate this contention. Science has given us a view of original nature that cuts deep, philosophically. We now view the human infant as little more than a vegetable at birth, a bouncing, babbling, cooing, kicking protoplasmic mass that may become human in an environment that provides opportunities for expression. Here is a fact that philosophy in education cannot ignore. It cannot, for instance, build a program that conceives the individual as wholly sinful at birth; nor, indeed, can it formulate a scheme which assumes that the infant is totally good when it enters this world. Philosophy has been brought to realize that goodness and badness are designations which do not apply to original nature. Science, at this point, introduces evidence which forces philosophy to construct a scheme that builds on a basis of moral neutrality. Educationally, this carries tremendous import. It vitiates at once those schemes of moral education which attribute moral quality to original nature.

Philosophy, in other words, must start with its feet on the earth. This fact is illustrated in psychology. Here we have learned that the individual always responds in terms of satisfactions. Philosophy cannot afford to build apart from this ground. On the other hand, this psychological evidence does not of itself furnish us with a program. We have witnessed recently an educational emphasis that would glorify the individual and permit him to seek his own satisfactions in his own way. This type of freedom means anarchy. We have also witnessed an attempt to discover, through analysis, the satisfactions which society at the moment values. This procedure makes it possible for the educator to perpetuate his own preferences and prejudices. And on occasion, though this is rare enough in these days when controversy rages about the concept of original nature, the assumption is made that the individual brings his satisfactions with him at birth.

What we need to emphasize is that a program is necessary to tell us which satisfactions to aspire to and which to shun. Satisfactions may guide activity, but life, strangely enough, is made up of situations which, despite their obvious conflict, promise satisfaction to one and the same individual. The important point is that the individual must select his satisfactions. This can be done, apart from mere expediency, only as he develops a point of view toward a satisfactory life. It is satisfying

to appear to be a hero even though lying is needed to establish the rôle. It is also satisfying to meet the ordinary demands of truthfulness. Both satisfactions may appear in one situation, but both may not be achieved in that situation. It is here that a person must decide to be a certain kind of individual; one way of life is deliberately rejected for the purpose of promoting the other. New satisfactions are thus created. This means that a particular view of life is fastened upon as of especial value. This view then makes possible the integration of the multitudinous and competing satisfactions that are inevitably faced. The development of such a program is the business of philosophy. It is never furnished by science, *as science*.

The problem of education is, apart from its complexity, in no wise different from that which the individual faces. Here, many conflicting satisfactions are possible. Education, if it is to be more than a hit and miss process, must evaluate these satisfactions in terms of an integrating principle, a program. Science in education, like science in every other field, is busy developing special techniques that promise an extension of knowledge. We are discovering more and more about the conditions that underlie learning; we are finding out even more about the causes of behavior that runs counter to the mores of the group; we are having light thrown on the difficult problem of ferreting out the unlearned behavior from that which has been acquired; we are even locating the particular acts which given individuals must perform in specific situations to meet the criteria of success set up by a particular society. These are merely indications of the many directions which science in education is progressing. And, these are contributions to which none but the foolhardy, and the unimaginative, would deny welcome.

It would seem safe to venture the view, therefore, that education is now in a position to advance its status materially. It is here that philosophy, if it successfully lives down its reputation, may provide a service of incalculable value; it is here that science, if it fails to sustain its reputation, may cause irreparable damage. My point is this: with the materials that are now at hand, an alliance between philosophy and science in education will elevate this process to a level of achievement never before attained. I think it would not be an overstatement to insist that the contributions of science have increased the responsibilities of the educator, so much so, in fact, that he is now morally obligated to make this alliance an actuality.

This thesis may be applied at almost any point in the educative process. We know in some considerable detail now, for instance, the duties that high-school teachers are called upon to perform. This is information of the highest value. But on this score, as on all others, the mere presence of facts, no matter in what quantity, does not provide us with an educational program. These facts, in themselves, do not answer the question, "what duties *should* the high-school teacher perform?" To this question science, except insofar as it frankly turns philosopher, can provide no answer. We know that behavior is shot through and through with habit. It is of paramount importance to know this; but, as knowledge, it does not tell us whether or not education should set its methods so that habit becomes the master of the individual or for the purpose of making the individual the master of habit. We know, too, that certain dates and events of historical importance occur more frequently than others in social intercourse, spoken and written. This fact, however, does not tell us what history to teach. We must again have recourse to our fundamental purpose. We are being told at the moment that students on the college level learn as much (and with equal or superior proficiency) in large classes as they do in small classes. Information of this sort is of value in the event that there is but one purpose of a college education, to absorb information. Change the purpose and the evidence slate is blank again.

It is possible, to be sure, to extend these illustrations. I am trusting that these are sufficient, however, to make my position obvious.

Let me restate this position. Philosophy is not an activity necessarily reserved for one who does nothing more than blow bubbles and dream dreams. Science, on the other hand, is not an obnoxious collector of things new and old. Science and philosophy are but different ways of dealing with facts. The former handles its facts to discover *what is;* the latter, with reference to the same facts, wants to determine *what should be.* In this sense, philosophy is in the van of its facts; in this respect, it is visionary. To be in the van implies a relationship to a main body, and those who criticize philosophy on this ground may do so legitimately only when they discover that its forward look has resulted in complete detachment.

These conclusions referred specifically to education leave us at about this point: Science tells us that we are dealing with a growing organism; it tells us under what conditions growth in varying directions, and for

differing individuals, is possible; it details, and thus simplifies, the complex social environment in which this organism must participate. Science thus provides us with a wealth of information about the individual (and individuals), his environment (and environments), and the relationship (and relationships) existing between them. But this is the end of the line. Science does not face the question, "what kind of growth should interest us?" Religion has an answer to this question. So, too, has the agnostic. Conservative, social and political leaders have a reply at hand, though it differs somewhat from that which progressive thinkers in these same fields would offer. Lovers of individual freedom, as well as those whose thinking has always a social reference, have particular answers to this question. When we face the proposition of giving direction to growth, we are involved in the task of formulating a program. And this brings us to philosophy.

If these arguments can be defended, then I wish to venture the belief that any education, which exalts one of these disciplines to the exclusion of the other, is hopelessly entangled in unimportant activity, in what Dewey has designated as, "busy work." Education, that depends solely on philosophy, will be in the position of the man who had nothing to hang on to and no place to fall. Education, that depends entirely upon science, taking its lead from hordes of facts, will find itself in the position of that vague group to whom the song-writer makes reference, "We don't know where we're going, but we're on our way." Education is too serious a matter to permit either eventuality to come to pass. It is time to recognize that we have an abundance of knowledge at our command which may be used to advance a comprehensive and unified educational program. When we come to the frank recognition of this fact, we can see at once that education is dependent upon both science and philosophy: from the one will come a program for the process, from the other will come the material basis and the earthy means for the actual operation of this program in a mundane world; (and if I may be permitted to philosophize for a moment), only then will education make a significant contribution to an intelligent way of life.

THE BEHAVIOR-PROBLEM BOY[1]

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DEFINITION

THE behavior-problem boy, for purposes of the study here reported, may be defined as the boy who, because of his undesirable behavior in the school or neighborhood, or because of his failure to comply with the provisions of the School Code, or for any other reason acceptable to the superintendent of schools, is transferred to the disciplinary school.

Practically every school system is confronted with the problem presented by the boy defined above, the boy who stands out prominently in his class because of his failure to identify himself with the group to which he, as a pupil, belongs. This type of boy tends to disrupt the school organization, destroy the morale of the classroom, and make teaching unpleasant and difficult.

PURPOSES OF THE STUDY

The present study is a survey undertaken for the purpose of obtaining information that may be of assistance and value in securing:

1. A knowledge of what constitutes the behavior-problem boy, based upon a scientific investigation of the conditions surrounding him, which may have been instrumental in the development of his anti-social tendencies.

2. A more intelligent judgment with reference to the possible usefulness of the disciplinary school in serving these children.

3. A knowledge of the post-school career of the behavior-problem boy as a measure of the effectiveness of the work in a disciplinary school, and as a partial answer to the question whether or not these boys make good in later life.

Two sources are available for obtaining data that may yield information tending toward the accomplishment of the purposes of this study; first, the literature pertaining to the behavior-problem boy and the delinquent; second, a personal study of the behavior-problem boy, using a disciplinary school as a laboratory.

[1] This paper is based on material presented for a doctorate at the University of Pennsylvania.

SCOPE OF THE STUDY

Turning to the first of the sources, the consensus of opinion of writers and students interested in the behavior-problem boy and his near relative, the delinquent, was obtained as regards:

1. Definitions of delinquency and behavior-problems—the inclusiveness of the term "juvenile delinquent," multiplicity of terminology.

2. Causes of delinquency and behavior-problems—difficulties in determining causation, home conditions as a factor, plurality of causation, and heredity versus environment.

3. Prevention and cure of delinquency and behavior problems—need of a scientific attitude, individual treatment essential, reformation in the home, the school's responsibility, institutions versus foster homes, and the court as a preventive agency.

The data for the second portion of the survey were obtained from the William A. Lee School in Philadelphia (now the Daniel Boone School). This school is the disciplinary center for the entire city. To it are sent the boys presenting the most pronounced anti-social tendencies. The entire student body is composed of this type of boy.

The Daniel Boone School, opened in September, 1928, contains, in addition to nine academic classrooms, provisions for the following types of activities: industrial arts, woodwork, printing, tailoring, sheet metal, library, commercial, auto mechanics, and physical education. Boys are sent to this school only after they have shown evidence of pronounced anti-social tendencies, and have failed to respond to the treatment afforded in the regular schools. Each case is reviewed and approved by the superintendent in charge before the boy is recommended for transfer.

Three groups of pupils were included in this portion of the study:

1. Boys whose names were entered on the register of the disciplinary school during the year 1926-1927.

2. Boys whose names were dropped from the register during the same year.

3. Boys whose names were dropped from the school register during the years 1920-1921 and 1921-1922.

The number of boys included in each of these groups was, respectively, 383, 377, 257, and 356, making a total of 1373 boys about whom the data were secured.

Data were secured regarding each of the following items, the source of the data also being indicated:

1. Causes of sending boys to disciplinary school; data obtained from record accompanying boy to the school.

2. Court records of boys at time of admission to the disciplinary school; data obtained through personal interview at time of admission.

3. Age at which misbehavior began; data obtained through personal interview.

4. Physical status of behavior-problem boys; data obtained from medical records and physical examination at time of admission.

5. Intellectual and educational status; data obtained from record of psychological examination and registration card showing progress of boy from date of his first entrance into the public schools of the city.

6. Age and race; data secured from registration card.

7. Nationality and citizenship—nationality of boys, nationality of parents, use of a foreign language in the home, citizenship of parents; data secured from registration card and through personal interview.

8. Religious affiliations of boys and parents; data secured through personal interview.

9. Family organization—the extent to which abnormal home conditions exist; data secured from personal interview.

10. Size of family and rank of boy in family; data secured from personal interview.

11. Home conditions and environment—ratings of home and neighborhood, overcrowding, roomers and boarders in the home, sanitary conditions; data secured through personal interview at time of admission and through home visit by social worker.

12. Economic status of parents; data secured through personal interview.

13. Out of school activities—attendance at church and Sunday School, membership in Boy Scouts organization, smoking, occupational activities, recreational pursuits, age of playmates, club and gang affiliations, musical interests; data obtained through personal interview.

14. Time spent in disciplinary school; data secured from registration card of all boys dropped from the school roll during year 1926-1927 and from other school records for boys dropped during 1920-1921 and 1921-1922.

15. Reasons for dismissal from disciplinary school; data secured from school records.

16. Post-school careers of behavior-problem boys—similarity to other groups in survey, mobility of families, present occupation or status of boys located, types of jobs held since leaving school, marital status of boys located, severance of home ties, ratings of neighborhoods; data se-

cured through visit to last known address of boys who left disciplinary school during 1920-1921 and 1921-1922.

TREATMENT OF DATA

The presentation of the data for the entire sixteen phases of the study is not possible in an article of this type. A somewhat detailed account of items one, two and four (as listed above) will serve to illustrate the variations in the selection and treatment of the data.

A. Causes of Sending Boys to the Disciplinary School.—The data were obtained from the record known as Form E 21 (Fig. 1) issued by the regular school for each boy who was to be transferred to the disciplinary center. The frequency of the various offenses was noted and grouped under appropriate headings. A total of 1100 offenses was charged against 365 boys who entered the school during the year 1926-1927 (Table I).

The white boys, numbering 265 were charged with a total of 767 offenses, an average of 2.86 offenses per boy; while the negro boys had an average of 3.33 offenses per boy. If such proportions were to remain constant for all groups of behavior-problem boys, the conclusion would follow that negro boys are more prone to commit the types of offenses that result in transfer to disciplinary centers. Further evidence of the tendency is indicated in the section of the study that compares the number of boys of each race in the disciplinary school with the numbers in the total school population for each race (item six).

An examination of the various offenses shows that truancy leads for both groups by a wide margin, 52.5 percent of the white boys and 41.0 percent of the negro boys being so charged. The predominance of this particular trait among the boys may indicate that the disciplinary school is largely a "truant" school, or it may indicate that truancy correlates highly with other delinquent tendencies.

Leaving school without permission is a phase of truancy, and also ranks high for both groups, being much higher for the white boys than for the negroes.

The list of classroom offenses shows a wide range of frequency. An examination of the phraseology used by the principals when filling out form E 21 seems to indicate a lack of uniformity as to what constitutes disobedience, disorder, impudence, etc.

Offenses against individuals, not including sex offenses, constitute a large proportion of the charges against the boys. In this particular type of offense the negro boys stand out quite prominently.

PARENTS' FIRST NAMES OR GUARDIAN'S FULL NAME	DATE OF BIRTH MONTH	DAY	YEAR	FIRST NAME	LAST NAME

RESIDENCE	NATIVE COUNTRY (CHILD)	NATIVE COUNTRY (FATHER)

SCHOOL	DISTRICT	TEACHER	GRADE

NOTE:—*Forward in triplicate to the District Superintendent after preliminary conference; one copy to be filed in the office of the district superintendent, one returned to principal referring case, one forwarded to principal or other person to whom the case is assigned.*

1—STATEMENT OF CASE

(A) NATURE OF DIFFICULTY—GIVING SPECIAL INSTANCES:

(B) DISCIPLINE, MEASURES ALREADY TRIED:

(C) HOME CONDITIONS AND ATTITUDE OF PARENTS:

(D) LIST OF PREVIOUS SCHOOLS AND TEACHERS WHICH CORROBORATE THIS RECORD:

2—RECOMMENDATION

(A) SPECIFIC TREATMENT SUGGESTED:

(B) ATTITUDE OF PARENT TOWARD ABOVE RECOMMENDATIONS:

DATE. PRINCIPAL.

3—DISPOSITION OF CASE

DATE. DISTRICT SUPERINTENDENT.

FORM E 21—DISCIPLINE CASE REPORT, PRINCIPAL—SCHOOL DISTRICT OF PHILADELPHIA

FIG. 1. DISCIPLINE CASE REPORT BLANK

TABLE I

OFFENSES CAUSING TRANSFER TO LEE DISCIPLINARY SCHOOL
Boys Admitted 1926-1927

	Number			Percent		
	White	Negro	Total	White	Negro	Total
Truancy						
Truancy	139	41	180	52.5	41.0	49.3
A.W.O.L. (leaving school without permission)	53	15	68	20.0	15.0	18.6
Classroom Offenses						
Disobedience	124	39	163	46.8	39.0	44.7
Disorder	56	31	87	21.0	31.0	23.8
Defiance	51	19	70	19.2	19.0	19.2
Impudence	49	21	70	18.5	21.0	19.2
Insolence	18	6	24	6.8	6.0	6.6
Sullenness	18	3	21	6.8	3.0	5.8
Incorrigibility	16	3	19	6.0	3.0	5.2
Impertinence	9	10	19	3.4	10.0	5.2
Temper tantrums	8	4	12	3.0	4.0	3.3
Stubbornness	4	2	6	1.5	4.0	1.6
Insubordination	4	3	7	1.5	3.0	1.9
Inattention	3	1	4	1.0	1.0	1.1
Lying	3	2	5	1.1	2.0	1.4
Offenses Against Persons						
Fighting or bullying	50	40	90	18.9	40.0	24.7
Threatening officials	20	13	33	7.5	13.0	9.0
Insulting remarks to officials	8	7	15	3.0	7.0	4.1
Cruelty to children	5	8	13	1.9	8.0	3.6
Offenses Against Sex						
Immoral or obscene talk	22	18	40	8.3	18.0	11.0
Immoral actions	11	14	25	4.2	14.0	6.8
Assault	5	4	9	1.9	4.0	2.5
Offenses Against Property						
Stealing	12	10	22	4.5	10.0	6.0
Trespassing	11	2	13	4.2	2.0	3.6
Vandalism	7	0	7	2.6	0.0	1.9
Incendiarism	2	0	2	0.8	0.0	0.5
Miscellaneous Offenses						
Profanity	29	10	39	10.9	10.0	10.7
Smoking	22	2	24	8.3	2.0	6.6
Lawlessness	5	5	10	1.9	5.0	2.7
Intoxication	3	0	3	1.1	0.0	0.8
Total Offenses	767	333	1100			
Total Cases	265	100	365			

Sex offenses and indecent conduct are likewise more prone among the negro boys.

Offenses against property are of such infrequent occurrence that they show no points of significance, except that theft was proportionately twice as great among the negro boys.

B. Court Records of Boys Admitted to the Disciplinary School.—The extent to which behavior-problem cases, as defined in this study, are also technical delinquents, in the sense of having been arrested, may be secured by reference to —a, Table II, which shows the number of boys who had court records at the time of their admission to the disciplinary school. The data were secured by means of a personal interview with each boy shortly after his admission to the school. These data constitute only a portion of the information gathered during the seemingly

very informal chat that was held with each new arrival. Subsequent checking of all the points covered during the interview with court records, school records, probation officers, the home, and elsewhere, indicated that there was no tendency to misstate facts on the part of the boys.

Almost half of each of the racial groups had become more or less familiar with court procedure through arrest. Furthermore, almost one-half of those who had been arrested were still under the jurisdiction and control of the court (b, Table II). Not only had such a large proportion of the boys been taken to task for their anti-social behavior, but a goodly portion of them had committed misdemeanors of such magnitude, or had been before the court so many times, that the judges had felt it necessary to restrict the liberty of some of them, as is shown by the fact that 12.9 percent and 8.7 percent respectively, of the white and negro boys admitted during the year had been committed to reform institutions. (c, Table II).

It should be noted that in all phases of the court records of the boys the whites made a poorer showing than the negroes. This is especially

TABLE II

COURT RECORDS OF 279 WHITE BOYS AND 104 NEGRO BOYS ADMITTED TO LEE SCHOOL, 1926-1927

(a)	BOYS WITH COURT RECORDS AT TIME OF ADMISSION		
	White	134	(48.0%)
	Negro	48	(46.2%)
	Total	182	(47.5%)
(b)	BOYS ON PROBATION AT TIME OF ADMISSION		
	White	71	(25.4%)
	Negro	22	(21.2%)
	Total	93	(24.3%)
(c)	BOYS FORMERLY IN REFORM INSTITUTIONS		
	White	36	(12.9%)
	Negro	9	(8.7%)
	Total	45	(11.7%)

true as regards the boys who have spent time in reform institutions (c, Table II), the percentage of white boys being more than one-third greater than the negroes.

C. Physical Status of Behavior-Problem Boys.—The presence of physical defects, such as diseased tonsils or adenoids, carious teeth, malnutrition, defective vision, has often been seized upon as having a causal relation to misbehavior. To properly evaluate the effects of such defects upon behavior, it would be necessary to make a comparison with the rate of incidence of the defects among children in general.

Burt[2] has done this with regard to height, weight and general bodily growth, and found that the thirteen-year-old boys in the reform schools were nearly four inches shorter and nine pounds lighter than other boys of equal age. He further indicates that most repeating offenders are frail, sickly and infirm; that nearly 70 percent of his cases were suffering from bodily weaknesses and ill health, and that nearly 50 percent were in urgent need of medical treatment.

The conclusions reached by Burt are quite at variance with those expressed by Hoag and Williams,[3] who, from their experiences conclude that there is usually no greater proportion of diseases and physical defects among juvenile delinquents than among the general population of school children in the same community.

Healy and Bronner[4] are in accord with Hoag and Williams. They have concluded that the delinquents are, in general, closely similar to the general group of young people as far as can be ascertained by available standards of comparison. This fact is strikingly illustrated in their age-weight correlations for delinquent boys in Chicago and Boston. While the median for their groups approximates the norm for the general population of like ages, the variation above the curve is greater than below.

The same condition has been found to hold for 150 boys entering the Lee School during 1926-1927. The data were secured by measurements at the time of the arrival of the boys at the disciplinary school, the measurements, examinations and checks against the medical cards being made by a teacher in the physical education department. Figure 2 shows the correlation, using Burk's[5] curve as the norm for the population at large. Fully two-thirds of the cases are above the curve. As Healy and Bronner point out, this physical overgrowth may have a causal relationship to delinquency through restlessness, need for greater physical self-expression, and because of the poor adjustment that may exist in and out of the school on account of this overdevelopment.

The rate of incidence of dental, visual, aural, auditory and nasal defects among the children in the present study was found, by examination and by checking against the medical records of the pupils, to be so low as to be considered negligible. The absence of these defects may

[2] Burt, Cyril. *The Young Delinquent.* (New York: D. Appleton and Co., 1925), p. 201.

[3] Hoag, Ernest Bryant and Williams, Edward H. *Crime, Abnormal Minds and the Law.* (Indianapolis: The Bobbs-Merrill Co., 1923), p. 139.

[4] Healy, William and Bronner, Augusta F. *Delinquents and Criminals—Their Making and Unmaking.* (New York: The Macmillan Co., 1926), Ch. 16.

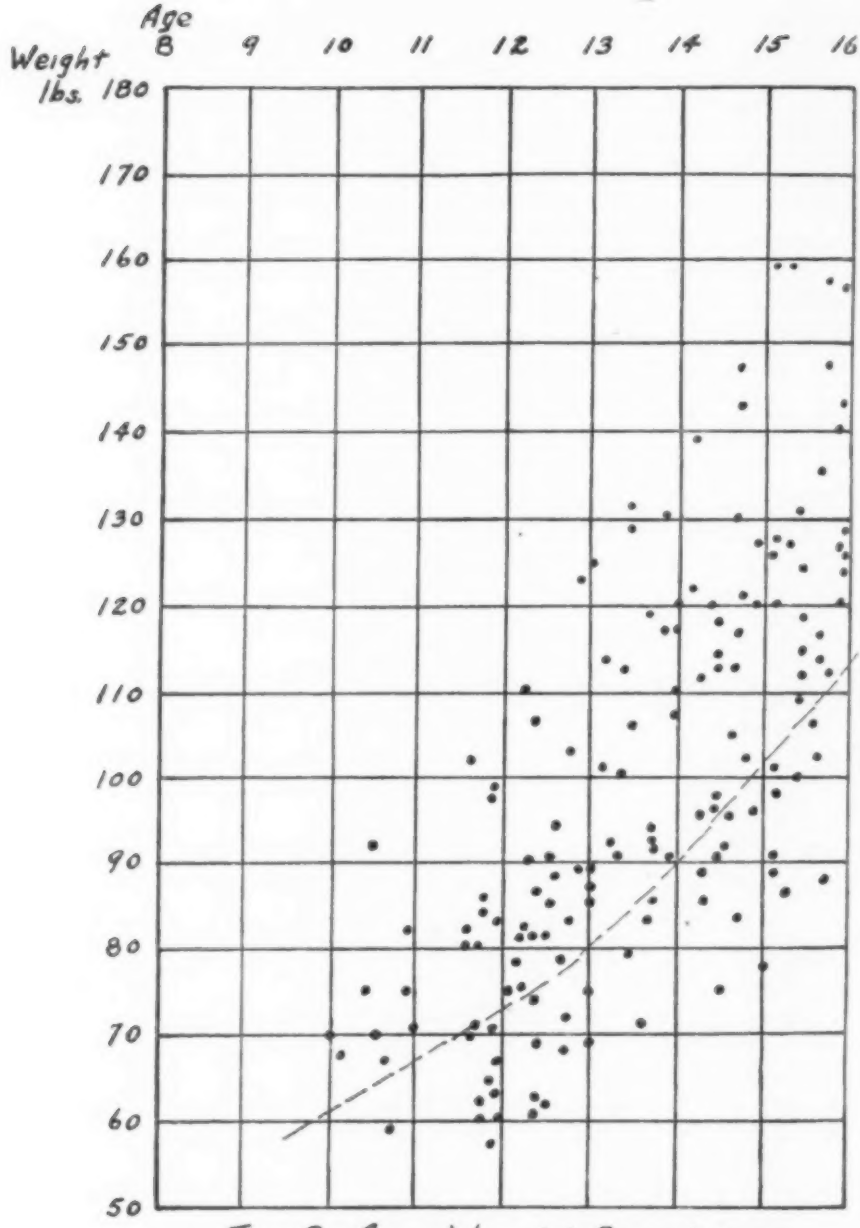

FIG 2. Age-Weight Correlations
150 Boys Admitted to Lee School 1926-27

be attributed, to a large extent, to the effectiveness of the work of the Division of Medical Inspection of the Philadelphia Public Schools. The routine medical examination on the part of the medical inspectors, together with the follow-up work on the part of the school nurses, serve to keep to a minimum the number of remedial defects.

CONCLUSIONS

The above data are typical of the larger body of data from which this report is drawn. Insofar as the literature pertaining to the delinquent and the behavior-problem boy is concerned, the following conclusions may be drawn:

1. There is need for a more uniform interpretation of the term "delinquency." The inclusiveness of a commonly accepted definition is less important than its conciseness and definiteness. It may be advisable to restrict the scope of the term to include only those who have committed overt acts that have brought them into contact with the court. On the other hand, it may be more advantageous to follow a tendency, that is apparent, to broaden the term and make it all-inclusive, embracing not only those who have court records, but also any who, because of their behavior or environment, are likely to become subjects of official action. Or, it may be that the term delinquent is ill-advised, and another term should be employed that would be more appropriate.

Definitions of the behavior-problem boy are almost entirely lacking. The general tendency seems to be to use "behavior-problem" and "delinquent" interchangeably. There is, however, an increasing use of the former term. Perhaps the present confusion of terms would be clarified if we confined the use of the term "delinquent" to those children who are technically such through contact with the court, and use the term "behavior problem" to refer to children who differ from others because of the manifestation of undesirable traits, habits, or behavior, whether in the home, school or community, without regard to the presence or absence of a court record.

2. Much of the difficulty in determining the causes of delinquency and behavior-problems is due to the fact that no single source or influence can be seized upon as the factor of causation. Poor home conditions stand out prominently as one cause, but not the only one. Heredity and environment, in their various and diverse manifestations, also have

[8] Burk, Frederic. "Growth of Children in Height and Weight." *American Journal of Psychology*. April, 1898.

a share in the production of delinquent and anti-social tendencies. The extent to which one of these factors enters into the problem seems to be a moot question, and, indeed, one that seems likely to remain so for some time to come.

3. Progress in both the preventive and curative aspects of delinquency and behavior problems is dependent upon the development of a scientific technique, that will contribute to the effectiveness of the work of the various agencies and individuals that are attempting to find a solution to the problem. The subject of individual treatment is inseparably bound up with the problem of developing a scientific technique. General principles having been established as a point of departure, the progress of any particular problem may be directed to the best advantage through individual study.

There is evidence of unanimity of opinion among those interested in delinquency and behavior problems that the home often exerts influence that is negative or worse upon children, and must be given an important place in any preventive and curative program. The school, because of its strategic position, should and must utilize all of its resources not only to remedy the damage that has been done, both in the school and elsewhere, but also to prevent the development of behavior problems and delinquency.

The relative merits of foster homes and institutions need careful study and evaluation before any conclusions are drawn. Platitudes sound very well but do not always work out satisfactorily when put to the test. The needs of each particular case must determine whether a foster home or an institution is more likely to aid in the solution of the individual's problem. The burden of proof for the abolition of institutions rests upon those seeking to eliminate them. Possibly the solution is to be found in a better type of organization and administration of institutions rather than their removal.

The juvenile court will be of the greatest value when it becomes an integral part of the school system, presided over by school officials grounded in law, as well as in the principles of psychology and pedagogy. At present the school and the court are, in rare instances only, adequately coöperating to discover and prevent the development of delinquent tendencies among boys and girls.

If we accept the data secured from the study of the boys who were attending, or had attended, a disciplinary school as being representative of boys who present behavior problems, we may draw the following conclusions:

1. The behavior-problem boy is characterized by the fact that his anti-social tendencies manifest themselves along several lines. He does not commit merely an isolated act, but is usually guilty of several, as is evidenced by the fact that there was an average of 2.86 offenses per white boy and 3.33 offenses per negro boy.

2. Truancy is the form of behavior that predominated among these boys, 51.5 percent of the white boys and 41.0 percent of the negroes being so charged.

3. The usual classroom activities make little or no appeal to the behavior-problem boy as is indicated by his disobedience, defiance, insolence, insubordination and other attitudes toward classroom procedure.

4. Not only is this type of boy a truant, and uninterested in his classroom activities, but his anti-social manifestations lie in antagonism toward the authority of all officials, defiance of them, and in physical violence to persons.

5. There is an almost even chance that the behavior-problem boy has a court record, as is shown by the fact that 48.0 percent of the white boys and 46.2 percent of the negro boys had made one or more appearances in court.

6. That the behavior-problem boys are not the boys who commit isolated acts is further proven by their own statements as to the time when their misbehavior began. In the great majority of cases these boys were troublesome for one or more years prior to the time of their transfer to the disciplinary school.

7. Physically the boys are no different from the general population. If anything, they tend to be over-developed physically. This tendency to be above average for height and weight may have a causal relationship to delinquency. In the matter of dental, aural and other defects they likewise show no marked variation from the normal.

8. Intellectually these boys are below average; the white boys having a median IQ of 75 and the negroes 80. Practically one-third of the former group and one-fourth of the latter may be definitely classed as mentally deficient. The extent to which low intelligence is a factor in the production of conduct disorders has not been definitely settled. Caution should be exercised in drawing the conclusion that low intelligence is necessarily concomitant with behavior problems and delinquency.

9. Educationally, the behavior-problem boy profits little by the type of curriculum found in the elementary schools. Not only is he retarded when he arrives at the disciplinary school, but the beginning of his re-

tardation can often be traced back to the very early years of his school life.

10. There is more than an even chance that, in proportion to the population, the behavior-problem boy will be a negro. Among the white boys the problem boy is almost certain to be the native born son of parents belonging to certain national groups.

11. The age at time of admission to the disciplinary school, as well as at time of dismissal, tends to be higher for the white boys than for the negro boys, the median ages for the former being fourteen and fifteen, respectively, and for the latter thirteen and fourteen, respectively.

12. The citizenship status of parents will not serve as a measure for identifying the behavior-problem boy.

13. Religious affiliation of the child and his parents, likewise, is not a good guide post. While a certain religion predominated among the white boys, due care must be taken not to draw faulty conclusions.

14. The behavior-problem boy will quite often be found in homes that are abnormal as regards organization and marital relations of parents.

15. There seems to be a tendency for the oldest boy in the family to become a behavior problem, with little conclusive evidence regarding a child who is the only one, or the youngest, in the family.

16. There is considerable likelihood that the problem boy will be found in homes and neighborhoods that rank below the average for the general population. Such homes will tend to be overcrowded, to contain relatives and boarders in addition to the family, and frequently to be lacking in the conveniences that we are accustomed to expect in a home.

17. The occupational status of the parents will be found to rank relatively low. Most of the fathers will classify as laborers and unskilled or semi-skilled operatives in the different occupational classifications.

18. The majority of the mothers of the boys will be found to be gainfully employed because of the absence of the father or to supplement the income of the home. Domestic service and other non-skilled work most frequently represent the type of employment sought by the mothers.

19. The behavior-problem boy is not inclined to work during his leisure time, even though there is evidence that the home is in need of financial assistance. He is more inclined to run the streets, spend his time in the movies, or otherwise idle away the hours. He does not show an inclination to join worthwhile clubs or social organizations, but is more prone to join a gang that has, at best, no definite purpose or

function. There is a tendency on the part of these boys to attend church. They are present in body if not in spirit. The church seems to have greater drawing powers for the negro boys than for the whites.

20. The white boys are more addicted to the use of tobacco than are the negroes, as is indicated by the fact that 61.6 percent of the former group and 26.0 percent of the latter admitted using tobacco to a considerable extent.

21. No significance can be attached to the ages of the playmates of behavior-problem boys.

22. Behavior-problem boys do not tend to spend their leisure time in learning to play musical instruments. This may be partially attributable to economic reasons as well as to lack of interest.

23. Behavior-problem boys, as represented by the groups included in the survey, tend to spend about one school year, or ten months in the disciplinary school. The factors of age and grade at time of admission tend to increase or decrease the length of this period, as do the efforts put forth by the boys to conform to social and educational rules and regulations, and thus earn their return to regular classes.

24. Dismissal from the disciplinary school marks the end of the school career for approximately half the boys. When we further consider the amount of training they have received, as indicated by the grades attained when they left (median grade for white boys, six, for the negro boys, five), it becomes evident that they are not well equipped for participation in life's activities.

25. There is a considerable tendency among the families of behavior-problem boys to move, as is evidenced by the fact that only 33 percent of the boys dropped from the school roll during 1920-1921 and 1921-1922 were located.

26. The extent to which boys leaving the disciplinary school are unprepared to make, at least, an economic success of life is indicated by the types of positions they now hold and have held since their release from school. With few exceptions these positions may be rated among the unskilled or semi-skilled.

27. There seems to be a greater tendency among behavior-problem boys in Philadelphia to marry young than is true of a similar group of boys in New York City.

28. There is also a pronounced tendency among these boys to sever home ties for reasons other than matrimony.

29. The neighborhoods in which the boys, who have been out of school five or more years, live do not rank any better than the neighborhoods of the 1926-1927 group that were rated. This fact may serve as further evidence of the inability of the boys, together with their families, to attain a fairly satisfactory degree of economic success.

SOME CONSTRUCTIVE PROPOSALS

In the light of the conclusions that have been drawn regarding the behavior-problem boy the following constructive proposals are briefly stated.

1. Increase the length of time spent in disciplinary schools.
2. Modify the curriculum to fit the intellectual and educational limitations of the behavior-problem boys.
3. Develop a program of counselling and guidance that will serve to accelerate the process of readjustment of these boys.
4. Organize (or re-organize) the school to make ever-increasing provision for non-academic work of the trade training type.
5. Consider the element of personality as an important factor in the selection of teachers who are to handle behavior-problem children.
6. Measure the effectiveness and adequacy of the work of the school by a continuous study of the after-careers of the product turned out by the school.
7. Make further study of the points of similarity and difference between the behavior-problem boy and the delinquent, using the latter term to refer to those with court records.
8. Compare a group of behavior-problem boys with a group who are not mal-adjusted, keeping constant all other factors—age, intelligence, economic status of family, environment, etc.

VALIDATION OF METHODS OF TESTING SPELLING

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THIS article reports the results of an investigation that was made to discover the comparative validity of three methods of testing ability to spell. A number of considerations lend significance to the study of this problem. First, there is a growing conviction, based on experimental data, that test results are often invalidated because of the methods of testing that are employed. Second, much emphasis is being placed upon testing in our best modern instructional technique. Third, the need for both survey tests and diagnostic tests in conducting remedial work is increasing.

The three methods of testing spelling, the comparative validity of which the study seeks to determine, are for convenience of discussion designated as (a) oral recall, (b) written recall, and (c) multiple choice. By way of conserving space these three methods will hereafter be referred to respectively as OR, WR, and MC. Each word in the OR type of test is first pronounced by the examiner and used in a meaningful sentence; then, it is spelled by the student on paper prepared for the purpose. In the WR type the student is confronted with a test paper in which each word, in its most frequently misspelled form, appears in parenthesis as a regular part of a meaningful sentence. The learner is directed to write the correct spelling of each misspelled word in the blank parenthesis at the end of each line. This plan of testing is illustrated by the following sentence: Can you (recomend) this man? (recommend). In the MC type of test the student is confronted with a test paper and in each sentence four spellings of some word appear in parenthesis as a regular part of a meaningful sentence. One spelling is correct; the other three are incorrect. The misspellings are those which are most frequently found. The student takes the test by underscoring the spelling which he thinks is correct, as is illustrated by the following exercise: This story will (ilustrate illustrat illustrate illistrate) my point.

DATA AND METHODS

The criterion, set up in this study for establishing the validity of methods of testing spelling, is the potency with which the different methods discover words that students cannot spell. Accordingly, the data on which the investigation is based consist of misspellings resulting from the attempts of students to spell a common list of fifty words embodied

in the types of tests described above. The test words were derived from the upper range of the Buckingham Extension of the Ayres Spelling Scale. The study involves 781 students who ranged in educational maturity from the seventh grade through the first year of college. All three methods of testing were tried out on 699 students; two methods, OR and WR, were used with 82 additional students. The study involves 117,150 running words. The order of testing was purposely varied for different student groups.

Two procedures were used for measuring the ability of the three types of testing technique to discover words which have not been thoroughly learned. The first, the method of averages, was used for comparing the average number of words misspelled in the different types of tests. The second procedure, the method of percents, was utilized for comparing the percent of students in the various groups for whom each type of test proved superior in selective potency.

RESULTS

Tables I and II record results obtained from trying out each type of test on 380 students in the order of WR-OR-MC. Each test embodied the same list of fifty words. Table I gives the average number of words misspelled by each of nine groups of students and by the total group. Reference to Group 1 will show how the table reads. Thus, the 37 students comprising the group misspelled on the average 22.8 words in the WR test, 19.8 words in the OR test, and 17.7 words in the MC test. Table II records the percent of students in the various groups for whom each method of testing proves superior in power to detect lack of spelling mastery.

Analysis of the results obtained from the order of testing indicated in Tables I and II reveals a number of interesting facts. One outstanding fact is the marked superiority of WR over the other methods of testing. This statement holds true, both from the standpoint of average number of words misspelled and from the standpoint of percent of students for whom the method is superior in selective potency. The statement also holds true, no matter whether it is applied to the total group of 380 students or to the nine separate groups. A second fact is the consistency in superiority of WR over OR and of OR over MC. A third noteworthy fact is that MC is by far the least effective of the three methods in detecting words that have not been learned to the point of mastery.

The reader will recall that the results presented in Tables I and II were those obtained from tests administered in the order of WR-OR-MC.

TABLE I

AVERAGE NUMBER OF MISSPELLINGS PER STUDENT RESULTING FROM TESTS GIVEN IN THE ORDER OF WR-OR-MC

Number of the Group Tested	Grade Level of Group	Number of Students in the Group	Average Number of Misspellings per Student		
			WR	OR	MC
1	8	37	22.8	19.8	17.7
2	8	41	22.0	19.4	17.0
3	8	31	30.8	26.3	21.3
4	8	32	32.7	30.3	24.2
5	8	33	29.0	25.1	22.3
6	8	34	26.8	24.3	21.2
7	8	39	35.5	33.4	26.5
8	9	40	25.0	23.1	19.1
9	10	93	20.4	18.6	14.6
Total		380	26.1	23.5	19.5

TABLE II

PERCENT OF STUDENTS FOR WHOM WR, OR AND MC, IN THE ORDER GIVEN, PROVE SUPERIOR IN DETECTING LACK OF WORD MASTERY

Number of the Group Tested	Grade Level of Group	Number of Students in the Group	Percent of Students for Whom Each Method Is Superior		
			WR	OR	MC
1	8	37	70.3	13.5	5.4
2	8	41	68.3	19.5	4.9
3	8	31	77.4	13.0	0.0
4	8	32	65.6	25.0	3.1
5	8	33	75.7	18.2	0.0
6	8	34	70.6	20.6	6.0
7	8	39	69.2	20.5	0.0
8	9	40	60.0	12.5	7.5
9	10	93	57.0	22.5	5.3
Total		380	66.3	18.1	3.9

Note: WR and OR are equally superior for 8.4 percent of the students; WR and MC, for 1.6 percent; OR and MC, for .5 percent; WR, OR, and MC, for .2 percent.

In order to discover the influence which a different order of testing might exert, the three types of tests involving the same fifty word list were tried out on another group of 182 students in the order of OR-WR-MC. Table III records the average number of words misspelled by each of the seven groups and by the total group. Table IV shows the percent

TABLE III

AVERAGE NUMBER OF MISSPELLINGS PER STUDENT RESULTING FROM TESTS GIVEN IN THE ORDER OF OR-WR-MC

Number of the Group Tested	Grade Level of Group	Number of Students in the Group	Average Number of Misspellings per Student		
			OR	WR	MC
1	7	28	35.2	33.7	24.5
2	8	40	20.9	20.5	15.2
3	8	28	32.4	30.5	21.8
4	8	13	28.3	27.0	19.6
5	10	24	21.2	19.6	15.3
6	11	26	23.7	23.6	17.0
7	12	23	19.1	19.2	14.7
Total		182	25.6	24.7	18.2

of students in each group and in the total group for whom each test proved superior in power to detect words which had not been mastered. These two tables are read in the same way as Tables I and II respectively.

TABLE IV

PERCENT OF STUDENTS FOR WHOM OR, WR AND MC, IN THE ORDER GIVEN, PROVE SUPERIOR IN DETECTING LACK OF WORD MASTERY

Number of the Group Tested	Grade Level of Group	Number of Students in the Group	Percent of Students for Whom Each Method Is Superior		
			OR	WR	MC
1	7	28	57.1	39.3	0.0
2	8	40	50.0	37.5	2.5
3	8	28	57.1	32.1	3.6
4	8	13	69.2	30.8	0.0
5	10	24	57.3	16.7	12.5
6	11	26	34.7	50.0	3.8
7	12	23	34.8	43.5	4.3
Total		182	50.5	36.3	3.8

Note: OR and WR are equally superior for 7.1 percent of the students; OR and MC, for .5 percent; WR and MC, for 1 percent; OR, WR and MC, for .5 percent.

Examination of the results yielded by the order of testing indicated in Tables III and IV shows in the main that OR is somewhat more effective than WR in power to discover words that students have not mastered. This superiority, however, is not consistently maintained for the separate groups. On the basis of average number of misspellings per student, OR is inferior to WR for Group 7 and barely holds its own with WR for Groups 2 and 6. On the basis of percent of students for whom each method of testing is superior, OR is surpassed by WR for Groups 6 and 7. Study discloses the further fact that MC is by far the least effective of the three methods in detecting inability to spell.

Tables V and VI record results obtained by giving the tests to 107 students in the order of MC-WR-OR. The tests for Group 1 embodied the same fifty words that were used in the order of testing reported above; those for groups 2 and 3 included twenty-five of the same words. The average number of words misspelled by the various groups and by the total group is given in Table V; the percent of students for whom

TABLE V

AVERAGE NUMBER OF MISSPELLINGS PER STUDENT RESULTING FROM TESTS GIVEN IN THE ORDER OF MC-WR-OR

Number of the Group Tested	Grade Level of Group	Number of Students in the Group	Average Number of Misspellings per Student		
			MC	WR	OR
1	8	41	9.0	11.8	10.6
2	8	42	6.2	6.8	6.1
3	College Freshmen	24	5.8	6.3	5.5
	Total	107	7.2	8.6	7.7

each method proved superior in detecting spelling uncertainty appears in Table VI. These tables are read in the same way as Tables I and II respectively.

TABLE VI

PERCENT OF STUDENTS FOR WHOM MC, WR AND OR, IN THE ORDER GIVEN, PROVE SUPERIOR IN DETECTING LACK OF WORD MASTERY

Number of the Group Tested	Grade Level of Group	Number of Students in the Group	Percent of Students for Whom Each Method Is Superior		
			MC	WR	OR
1	8	41	7.3	53.7	19.5
2	8	42	16.7	35.7	16.7
3	College Freshmen	24	16.7	25.0	4.2
	Total	107	13.1	40.2	14.9

Note: MC and WR are equally superior for 7.5 percent of the students; MC and OR, for 4.7 percent; WR and OR, for 10.3 percent; MC, WR and OR, for 9.3 percent.

The most outstanding fact yielded by analysis of Tables V and VI is the marked consistency with which WR maintains its superiority over OR and MC in revealing uncertainty of spelling. Another fact is that, while OR on the whole is more effective than MC in detecting lack of word mastery, the latter is more effective for Group 3 and is about equally effective for Group 2.

The results set forth in Tables VII and VIII differ from those presented in the two preceding tables, in that they were derived from tests given to another group of 113 students in the order of MC-OR-WR. The findings for Group 3 are based on the same fifty words that were used in the order of testing indicated in Tables V and VI, while those for Groups 1 and 2 are based on twenty-five of the same fifty words. Table VII records the average number of words misspelled by the individual student groups and by the total group. Table VIII gives the percent of students for whom each method of testing proved superior in power to detect lack of certainty of spelling. The tables are read in the same way as Tables I and II respectively.

TABLE VII

AVERAGE NUMBER OF MISSPELLINGS PER STUDENT RESULTING FROM TESTS GIVEN IN THE ORDER OF MC-OR-WR

Number of the Group Tested	Grade Level of Group	Number of Students in the Group	Average Number of Misspellings per Student		
			MC	OR	WR
1	8	41	7.7	7.0	8.6
2	8	42	6.5	7.5	8.2
3	College Freshmen	30	9.1	10.1	10.1
	Total	113	7.6	8.0	8.8

TABLE VIII

PERCENT OF STUDENTS FOR WHOM MC, OR AND WR, IN THE ORDER GIVEN, PROVE SUPERIOR IN DETECTING LACK OF WORD MASTERY

Number of the Group Tested	Grade Level of Group	Number of Students in the Group	Percent of Students for Whom Each Method Is Superior		
			MC	OR	WR
1	8	41	36.6	7.3	39.0
2	8	42	11.9	21.4	40.5
3	College Freshmen	30	26.7	26.7	33.3
	Total	113	24.8	17.7	38.1

Note: MC and OR are equally superior for 2.6 percent of the students; MC and WR, for 2.6 percent; OR and WR, for 7.1 percent; MC, OR and WR, for 7.1 percent.

Several interesting facts emerge from the study of Tables VII and VIII. In the first place, WR continues to maintain supremacy over OR and MC. In the second place, neither OR nor MC is consistently superior to the other. Judged from the standpoint of average total misspellings, OR holds a slight advantage over MC; on the other hand, the advantage is reversed when judged on the basis of the total student group for whom the two methods prove superior in potency to detect words that have not been learned to the point of mastery. When the individual student groups are considered, MC is found to discover, on the average, more misspellings than OR for Group 1 and fewer misspellings for Groups 2 and 3. On the basis of percent of students for whom the two methods are superior in power to detect uncertainty of spelling, it is found that MC is more effective for Group 1, less effective for Group 2, and equally effective for Group 3.

Tables I to VIII inclusive present results derived from trying out all three methods of testing in varied order on four groups of students. Analysis of the data recorded in these tables reveals two major facts. The first is that the order of testing exerts a marked influence on the results obtained. Thus, with the tests given in the order of WR-OR-MC, the average number of words misspelled per student is respectively (see Table I) 26.1, 23.5, and 19.5; with the tests administered in the order of OR-WR-MC, the corresponding figures are (see Table III) 25.6, 24.7, and 18.2 When the tests are given in the order of WR-OR-MC, the percent of students for whom each method of testing is superior in detecting uncertainty of spelling is respectively (see Table II) 66.3, 18.1, and 3.9; corresponding figures for students tested in the order of OR-WR-MC are (see Table IV) 50.5, 36.3, and 3.8. The influence which the order of testing bears on the results is further revealed when one compares the findings recorded in the first four tables with those presented in the

last four. Comparison of the two sets of tabular data shows clearly that the degree of superiority which either WR or OR exercises over MC when the latter comes last in the test series is not maintained; in fact it is not nearly so marked when MC comes first in the series. The second fact is that MC, on the whole, is the least valid of the three methods under investigation.

It seems desirable at this point to study the validity of WR and OR as methods of testing with the influence of MC ruled out. Accordingly, Tables IX and X are presented. Table IX shows (a) the average number of misspellings per student obtained from giving the tests to 380 students in the order of WR-OR, and (b) the percent of students for whom WR and OR, in the order given, prove superior in detecting lack of word mastery. Table X records corresponding data derived from tests given to 182 students in the order of OR-WR.

TABLE IX

(A) AVERAGE NUMBER OF MISSPELLINGS PER STUDENT OBTAINED FROM TESTS GIVEN IN THE ORDER OF WR-OR; (B) PERCENT OF STUDENTS FOR WHOM WR AND OR, IN THE ORDER GIVEN, PROVE SUPERIOR IN DETECTING LACK OF WORD MASTERY

Number of the Group Tested	Grade Level of Group	Number of Students in the Group	Average Number of Misspellings per Student		Percent of Students for Whom Each Test Proves Superior in Detecting Lack of Word Mastery		
			WR	OR	WR	OR	Equally Superior
1	8	37	22.8	19.8	78.4	13.5	8.1
2	8	41	22.0	19.4	73.2	21.9	4.9
3	8	31	30.8	26.3	77.4	12.9	9.7
4	8	32	32.7	30.3	56.2	34.4	9.4
5	8	33	29.0	25.1	75.7	18.2	6.1
6	8	34	26.8	24.3	73.5	23.5	3.0
7	8	39	35.5	33.4	69.2	20.5	10.2
8	9	40	25.0	23.1	65.0	17.5	17.5
9	10	93	20.4	18.6	62.4	23.6	14.0
	Total	380	26.1	23.5	68.9	21.1	10.0

TABLE X

(A) AVERAGE NUMBER OF MISSPELLINGS PER STUDENT OBTAINED FROM TESTS GIVEN IN THE ORDER OF OR-WR; (B) PERCENT OF STUDENTS FOR WHOM OR AND WR, IN THE ORDER GIVEN, PROVE SUPERIOR IN DETECTING LACK OF WORD MASTERY

Number of the Group Tested	Grade Level of Group	Number of Students in the Group	Average Number of Misspellings per Student		Percent of Students for Whom Each Test Proves Superior in Detecting Lack of Word Mastery		
			OR	WR	OR	WR	Equally Superior
1	7	28	35.2	33.8	57.1	39.3	3.6
2	8	40	20.9	20.5	52.5	40.0	7.5
3	8	28	32.4	30.5	60.7	32.1	7.1
4	8	13	28.3	27.0	69.2	30.8	0.0
5	10	24	21.2	19.6	62.5	20.8	16.7
6	11	26	23.7	23.6	38.5	50.0	11.5
7	12	23	19.1	19.3	39.1	43.5	17.4
	Total	182	25.6	24.7	53.3	37.4	9.3

Inspection of Tables IX and X shows that, while the results are influenced by the order in which the tests are given, WR is on the whole superior to OR as a method of testing. Examination of the tabular data, from the standpoint of average number of student misspellings, reveals the fact that, with the tests given in the order of WR-OR, the former discovers on the average 2.6 more words than the latter; with the order of testing reversed, it is found that OR discovers an average of only .9 more words than WR. Study of the data from the same standpoint shows, moreover, that, with the tests given in the order of WR-OR, the supremacy of the former is consistently maintained for each of the nine student groups; on the other hand, with the tests given in reverse order, OR is inferior to WR for one of the seven groups and barely holds its own for two other groups. The evidence also favors WR, when considered on the basis of percent of students for whom each method is superior in power to detect lack of word mastery. Thus, when the tests are given in the order of WR-OR, the superiority of the former is much more marked than is that of the latter when the order of testing is reversed. In fact, when the tests are given in reverse order, WR is superior for two of the seven student groups.

In order to study further the comparative validity of WR and OR as methods of testing, the fifty words that have been used throughout the study were divided on the basis of spelling difficulty into two lists of twenty-five words each. The words comprising each list were embodied in the two types of tests and given to eighty-two 8A students. The tests based on the first list were given in the order of WR-OR, and those based on the second list in reverse order. The results are set forth in Table XI.

TABLE XI

(A) AVERAGE NUMBER OF STUDENT MISSPELLINGS DERIVED FROM TESTS BASED ON EQUALLY DIFFICULT WORDS AND GIVEN IN THE ORDER OF WR-OR AND OR-WR; (B) PERCENT OF STUDENTS FOR WHOM WR AND OR, GIVEN IN THE ORDERS MENTIONED ABOVE, PROVE SUPERIOR IN DETECTING LACK OF WORD MASTERY

	Average Number of Student Misspellings		Percent of Students for Whom Each Test is Superior		
No. of Students 82 Grade Level 8A					Equality
	WR	OR	WR	OR	Superior
Order of Tests: WR-OR	18.7	17.9	48.8	29.3	21.9
Order of Tests: OR-WR	16.9	17.7	28.0	57.3	14.6

Analysis of Table XI shows that WR and OR are equally effective when judged on the basis of average number of student misspellings. When the data are examined from the standpoint of percent of students,

for whom the two methods of testing are superior in detecting lack of spelling mastery, OR is found to hold a slight advantage over WR.

SUMMARY AND CONCLUSIONS

The facts yielded by analysis of the tabular data which have been presented seem to justify the following statements which are offered by way of summary and conclusion.

1. WR is on the whole the most effective of the three methods under investigation in detecting lack of word mastery; MC is the least effective.

2. There does not seem to be any best method of testing spelling for all students; while WR is found to be the most effective for the greatest number of students, OR is the most effective for other students, and MC for still others.

3. A composite test score derived from the tests used in this study is more reliable than a single test score.

4. The order in which the tests are given exerts a marked influence on the results. This influence seems to be due to practice effect.

5. Students with a high order of spelling ability exhibit far less variation in scores obtained from the three methods of testing than do students with a low order of spelling ability.

A CONVERSION SCALE FOR COMPARING SCORES ON THREE SECONDARY SCHOOL INTELLIGENCE TESTS[1]

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IN 1926, the Secondary School Examination Board, composed of a number of private college preparatory schools, appointed a committee to report on the advisability of including an intelligence test as a part of the examinations for entrance to the member schools. An additional function of this committee was to recommend a test to be used. It was found that certain schools were using the results of such tests quite extensively, and that others had experimented or were experimenting with them. Naturally different tests had been used by different schools, so it was necessary as one phase of the work to resolve the various scores to some common denominator in order to enable school executives to translate the scores made on one test into approximately equal scores on another test.

This paper presents the conversion or absolute scale worked out by means of which scores made on the Terman Group Tests of Mental Ability, Otis Group Intelligence Scale, Advanced Examination, and Otis Self-Administering Test could be stated in somewhat comparable terms.

It is recognized, of course, that scores on this absolute scale are not exactly comparable. The aggregation of items on the various tests measure different functions, so a score or an IQ obtained on the Terman test is not quite the same thing as one obtained on the Otis Advanced Examination, though correlations between the two are high.[2] The writer knows of no published correlations between the two varieties of the Otis test, but it should be high since the Self-Administering Test is made up of items selected from the Advanced Group Intelligence Scale. A correlation of $.72 \pm .03$ was obtained between the Terman and the Otis Self-Administering Test in the case of 111 boys used in this present study, who took the two examinations during the same month. It is to be distinctly understood that the absolute scales which follow are intended as a convenient help to administrators who may have pupils enter-

[1] For a slightly different method of comparing scores made on Intelligence Tests see the article by Kefauver, Grayson N. "Need of Equating Intelligence Quotients Obtained From Group Tests," *Journal of Educational Research*, XIX, (February, 1929), pp. 92-101.

ing with scores on a different test from the one he has been using. Since different tests are not more than approximately comparable, these scales are purely an empirical means of comparing scores but, as such, are believed to be of interest and of some practical value.

In all, 6,550 usable scores were made by boys between the ages of 13 and 19 in the following schools: Culver, Exeter, Fessenden, Germantown Friend's School, Groton, Hill, Huntington, Lawrenceville, Loomis, Milton, Riverdale, St. Mark's, St. Paul's, and Shadyside. Of these 6,550 scores, 2,063 were made on the Terman test, 2,055 on the Otis Self-Administering, and 2,432 on the Otis Advanced Examination. No attempt was made to differentiate between different forms of the same test. In examining the scores one is struck by the fact that they are relatively high, showing the selective character of the schools.[3] Until sufficient scores are added to these tables to make them typical of public school systems, they must be used with care.[4]

Raw scores were used instead of IQ's because, if one tries to compare intelligence test results from year to year, he immediately encounters difficulties due to the fact that the scores themselves are not stable and that the commonly used term "Intelligence Quotient" or IQ does not mean the same thing under all circumstances. The IQ is usually taken as the symbol representing a student's mental ability: his mental age as calculated from a table supplied with tests divided by his chronological age in years and months. But, as Dr. Otis points out in his "Manual of Directions" used with the Otis Self-Administering Tests, the term "Mental Age" has come to have a specialized meaning—measures of mental ability on the Binet-Simon Tests. For the group of boys examined here, such measures would be merely scores, since the Binet-Simon Test is best adapted to children from approximately five to fifteen years of age and does not differentiate on the higher levels.

Furthermore there are different methods in use among the schools for figuring the IQ, and in the higher ages the term is meaningless.[5] For example, in the Terman test a boy of 13 who scores 135 has a mental age of 16 and an IQ of 124. If the IQ is constant or relatively so, to secure

[3] Russell in a study at Harvard, based on 200 cases gives a correlation of .89 between the two.

[3] This same phenomenon is noticed in a study of the Hotchkiss School on the Army Alpha Test and described by Anderson, J. E., "The Intelligence of a Highly Selected Group." *School and Society*, XVI, (December 23, 1923), 723-725.

[4] The writer would be interested in receiving scores from public high schools, in order to reach the point where the addition of further scores would not affect the tables.

an IQ of 124 at age 15 he would have to score 223 which is beyond the total score possible on the test. The older a boy grows, therefore, the lower the IQ he can obtain on this particular test. To state an actual case, a boy aged 14 years and 3 months took this test, scored 120 and by following the Terman directions had an IQ of 107. He took another test at age 15 years and 11 months, scored 138, and his IQ was 101.

At one school, the device of using the divisor as 15 instead of 16 years, as the author suggests has been used, since experience showed a relatively constant IQ. An IQ at this school, therefore, means something different than at another school where the author's directions are followed and where the IQ's show a marked decrease as the age increases.

The method of constructing the conversion or absolute scale under discussion is based upon the transmutation formula for comparable scores discussed by Holzinger.[6] As he explains the process, standard or absolute scores on tests X_1, X_2, X_3 ..... may be defined "as the deviations from the mean divided by the respective standard deviations, or $\frac{x_1}{\sigma_1}, \frac{x_2}{\sigma_2}, \frac{x_3}{\sigma_3}$ ....." He continues "It will be noted that the standard score of a pupil gives his relative position in terms of a number of standard deviations above or below the mean. Thus, if the raw score be 120 with $M = 90$ and $\sigma = 10$, the standards score will be $\frac{120 - 90}{10} = +3$. If on another test this pupil scores 18 with $M = 12$ and $\sigma = 2$, his standard score will again be +3. His relative position in the distribution of both tests is clearly the same as shown by the standard scores."

Letting X_1, σ_1, and M_1 represent the raw score, standard deviation, and mean respectively on one test, and X_2, σ_2, and M_2, the raw score, standard deviation, and mean on a second test, we may write

$\frac{x_1}{\sigma_1} = \frac{x_2}{\sigma_2}$, or $x_1 = \frac{\sigma_1}{\sigma_2} x_2$.

Now, since $x = X\text{-}M$, this may be expressed in the form $X_1 = M_1 + \frac{\sigma_1}{\sigma_2}(X_2 - M_2)$, given by Holzinger as the transmutation formula for comparable scores.

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[5] Symonds makes the same point in his *Measurement in Secondary Education*, (New York: The Macmillan Company, 1927), 316-323.

[6] Holzinger, K. J. *Statistical Methods for Students in Education*. (Boston: Ginn and Company, 1928), 118-122.

The actual steps in the construction of the conversion, absolute, or standard scale under consideration—all three terms may be used interchangeably—were as follows: The test scores were arranged at intervals of six months as shown in Tables I, II, and III. Scores made by pupils below 13 years of age and above 19 are not included, because the number of cases was insufficient. This grouping gives twelve distributions on each test or thirty-six in all.

The mean and standard deviations were calculated for each age group for each test. For example, in Table I the mean of the group of seventy-seven pupils aged between 13 years, and 13 years 5 months, whose scores on the Terman test were available is 130.5, and sigma is 30.

The test scores were then converted into the standard or absolute scale on which the mean of each group was arbitrarily set at 50 and a distance of 10 units on this arbitrary or absolute scale was taken as one sigma. One sigma could have been taken to equal 5 points, 20 points,

TABLE I

DISTRIBUTION OF SCORES
TERMAN GROUP TEST OF MENTAL ABILITY

Age	13	13.6	14	14.6	15	15.6	16	16.6	17	17.6	18	18.6	
Score													Total
210			1		1	1	2	9	4	1		1	20
200		1	6	7	10	6	15	16	18	10	7	2	98
190	1	4	10	15	22	9	31	34	18	25	12	9	190
180	2	13	13	23	27	40	31	35	45	32	15	7	283
170	1	25	22	30	33	15	23	27	31	28	12	7	254
160	8	15	20	26	24	26	31	42	16	22	7	9	246
150	10	20	27	24	28	27	29	32	20	21	7	7	252
140	13	11	24	23	20	19	22	17	13	7	10	6	185
130	8	12	15	31	23	19	17	14	9	9	8	1	166
120	8	15	15	19	18	10	17	1	7	6	2	3	121
110	5	10	7	11	12	9	6	5	7	6	5	3	86
100	7	8	6	7	6	5	7	4	3	4	2		59
90	4	7	4	9	3	2	3	6	2	1	1		42
80	4	2	2	3	7	3	4	1	2	1		1	30
70	5	2	1			1	1	5		1		1	17
60	1	1	1	1	3	1	1						9
50				2		1	1	1					5
Total	77	146	174	231	237	194	241	249	195	174	88	57	2063
Mean	130.5	147.1	153.1	151.8	156.0	157.1	160.9	166.6	169.3	167.8	165.3	164.1	
Sigma	30.0	30.3	28.7	30.6	31.4	29.5	31.1	30.7	27.7	26.8	28.0	29.0	

or any number in fact; 10 was chosen so as to make the range about three sigmas above and below the means, giving in this case approximate limits of 20 to 80 for the absolute scale. Each point on the scale, therefore, equals one-tenth of sigma. In the distribution above referred to, where the mean is 130.5 and sigma 30.1, 130.5, or in round numbers 131, in the Terman test equals 50 on the absolute scale, 133.5 (134) equals 51, 127.5 (128) equals 49 and so on.

Holzinger points out that the standard scores secured by the method

TABLE II

DISTRIBUTION OF SCORES
OTIS GROUP INTELLIGENCE SCALE, ADVANCED EXAMINATION

Age / Score	13	13.6	14	14.6	15	15.6	16	16.6	17	17.6	18	18.6	Total
210	1		1			4	4	3	7	2	1	3	26
200			4	1	5	19	15	17	22	24	8	9	124
190	3	3	3	18	13	14	32	20	31	23	18	25	203
180	3	11	14	19	22	37	36	44	44	30	45	15	320
170	10	9	20	34	31	22	33	40	31	42	47	21	340
160	8	21	25	29	22	35	29	40	39	38	41	20	347
150	13	18	25	20	37	34	29	24	29	32	24	16	301
140	18	18	27	24	31	28	21	25	15	25	20	13	265
130	8	17	18	19	13	17	16	13	16	12	11	10	170
120	7	10	13	12	9	12	14	6	8	8	10	3	112
110	8	10	7	9	6	10	8	7	7	5	3	8	88
100	7	8	8	8	6	4	4	2	2	3	4	2	58
90	1	1	3	3	2	3	4		4		1		22
80	4	2	4	2	2		2	3	2	4	1	2	28
70		3	4		1	1	1			1		1	12
60	2	1	1				1	1	2		1	1	10
50			1	1			1	1					4
40				2									2
Total	93	132	178	201	200	240	250	246	259	249	235	149	2432
Mean	142.2	145.1	148.1	153.8	157.8	162.5	163.7	166.7	169.0	168.5	166.	165.4	
Sigma	29.6	27.3	29.9	30.7	25.4	27.3	30.0	26.5	28.6	26.0	23.8	29.0	

TABLE III

DISTRIBUTION OF SCORES
OTIS SELF-ADMINISTERING TEST OF MENTAL ABILITY

Age / Score	13	13.6	14	14.6	15	15.6	16	16.6	17	17.6	18	18.6	Total
70	2	3	5	8	5	4	10	24	21	16	13	1	112
65	7	9	10	11	16	26	33	31	51	42	43	3	282
60	16	15	16	16	27	31	37	45	56	39	47	10	355
55	8	10	13	17	25	38	48	38	53	49	62	16	377
50	10	14	17	18	23	45	33	45	41	46	47	15	354
45	3	10	21	18	24	7	36	25	22	42	21	20	249
40	7	5	14	17	15	18	16	18	14	14	13	7	158
35	10	10	10	10	7	6	7	5	6	5	3	3	82
30	5	4	5	7	5	4	4	3	4	3	5		49
25		2	2	3	5	1	2		1		1		17
20			2	1	1	2	2	1	1				10
15	1		1	1				3				1	7
10			1	1									2
5					1								1
Total	69	82	117	128	154	182	228	238	270	256	255	76	2055
Mean	52.1	52.7	50.4	51.2	52.9	55.4	55.4	56.7	58.2	56.2	57.5	52.4	
Sigma	11.9	11.5	12.3	12.3	11.6	10.0	10.1	10.7	9.5	8.4	8.8	8.6	

described, $\frac{X_1}{\sigma_1}, \frac{X_2}{\sigma_2}, \frac{X_3}{\sigma_3} \ldots$ are abstract numbers and may be combined by addition, provided the various distributions from which the original scores are taken are of the same general shape. Inspection of Tables I, II, and III shows that this condition holds in the case of the scores under consideration. While they are not symmetrical, they are, nevertheless, all skewed in the same direction toward the upper end of the distribution.

Thirty-six conversion scales were made in this manner as is seen in Tables IV, V, and VI. There is one scale for each six-month's age group

on each test. These scales furnish a convenient common denominator for reference to test scores on these three tests within the limitations mentioned. That they meet the definition of standard scores, as given by Holzinger, may be seen by substituting actual numbers for $\frac{x_1}{\sigma_1}, \frac{x_2}{\sigma_2}, \frac{x_3}{\sigma_3} \ldots\ldots$ Taking, for example, the 13 year old group on each of the three tests at the standard score of 56. In the case of the Terman test $\frac{x}{\sigma} = \frac{18}{30} = .6$. In the case of the Otis Advanced Examination, $\frac{x}{\sigma} = \frac{18}{29.6} = .608$, and in the case of the Otis Self Administering Test, $\frac{x}{\sigma} = \frac{7}{11.9} = .588$. The nearest single integer in each case is .6, which added to 50, the mean of the standard scale gives 56. The same is true in the case of the other points on the absolute scale.

The table is used as follows: Suppose a 14 year old boy makes a score of 185 on the Otis Advanced Examination. Running down the 14-14.5 column on the absolute scale for this test, we find that his absolute score is approximately 62, whereas if a 17 year old boy makes the same score, 185, his absolute score is approximately 56. If this 14 year old boy is entering a school which uses the Terman test, reference to the Terman absolute scale shows that an absolute score of 62 for a boy of this age gives, or has given in the case of over 174 boys, a score of 188. The chances are, since these two tests have a high correlation, that his Terman score would be about 188. If the same boy was to enter a school using the Otis Self-Administering Test, he would get a score of about 65. These absolute scales based on the actual performance of over 6000 scores from about 3500 boys avoid the ambiguity of the IQ and afford an empirical and convenient practical means of comparing scores on three different tests.

Based as they are on a rather highly selected group of boys, they are more suitable for use in boys' schools, having a selected student body, but are also susceptible to use in other schools where an approximation of aptitude is needed rather than a scale possessing the acme of statistical refinement.

TABLE IV

Absolute Scale

Terman Group Test of Mental Ability

Age	13	13.6	14	14.6	15	15.6	16	16.6	17	17.6	18	18.6
No. Cases	77	146	174	231	237	194	241	249	195	174	88	57
Mean	130.5	147.1	153.1	151.8	156	157.1	160.9	166.6	169.3	167.8	165.3	164.1
Sigma	30.0	30.3	28.7	30.6	31.4	29.5	31.1	30.7	27.7	26.8	28.0	29.0
Absolute Scale												
80	220											
79	218											
78	215											
77	212											
76	209											
75	206											
74	203	220	220									
73	200	217	219									
72	197	214	216	220		220						
71	194	211	213	216	220	219						
70	191	208	211	213	219	216				220	220	
69	188	205	208	210	216	213	220			219	219	220
68	185	202	205	207	213	210	217		220	216	216	217
67	182	199	202	204	209	207	214	220	217	213	213	213
66	179	196	199	201	206	204	211	217	215	211	210	211
65	176	193	196	198	203	201	208	214	212	208	207	208
64	173	190	193	195	200	198	204	211	208	205	205	205
63	170	186	190	192	197	196	201	208	205	203	202	202
62	167	183	188	189	194	193	198	204	203	200	199	199
61	164	180	185	185	191	190	195	201	200	197	196	196
60	161	177	182	182	187	187	192	198	197	195	193	193
59	158	174	179	179	184	184	189	195	194	192	191	190
58	155	171	176	176	181	181	186	192	191	189	188	187
57	152	168	173	173	178	178	183	188	189	187	185	184
56	149	165	170	170	175	175	180	185	186	184	182	182
55	146	162	167	167	172	172	176	182	183	181	179	179
54	143	159	165	164	169	169	173	179	180	179	177	176
53	140	156	162	161	165	166	170	176	178	176	174	173
52	137	153	159	158	162	163	167	173	175	173	171	170
51	134	150	156	155	159	160	164	170	172	170	168	167
50	131	147	153	152	156	157	161	167	169	168	165	164
49	128	144	150	149	153	154	159	164	167	165	163	161
48	125	141	147	146	150	151	155	160	164	162	160	158
47	122	138	144	143	147	148	152	157	161	160	157	155
46	119	135	141	140	143	145	149	154	158	157	154	153
45	116	132	139	137	140	142	145	151	155	154	151	150
44	113	129	136	133	137	139	142	148	153	152	149	147
43	110	126	133	130	134	137	139	145	150	149	146	144
42	107	123	130	127	131	134	136	142	147	146	143	141
41	104	120	127	124	128	132	133	139	144	144	140	138
40	101	117	124	121	125	129	130	136	142	141	137	135
39	98	114	121	118	121	126	127	133	139	138	135	132
38	95	111	118	115	118	123	124	130	136	136	132	129
37	92	108	116	112	115	120	121	127	133	133	130	126
36	89	105	113	109	112	117	117	124	131	130	126	124
35	86	102	110	106	109	114	114	121	128	128	123	121
34	83	99	107	103	106	111	111	117	125	125	121	118
33	80	96	104	100	104	108	108	114	122	122	118	115
32	77	93	101	97	100	105	105	111	119	120	115	112
31	74	90	98	94	97	102	102	108	117	117	112	109
30	71	87	95	91	94	99	99	105	114	114	109	106
29	68	84	93	88	91	96	96	102	110	112	107	103
28	65	81	90	84	88	94	93	99	107	109	104	100
27	62	78	87	81	84	91	89	96	105	106	101	97
26	79	75	84	78	81	88	86	93	102	103	98	95
25	76	72	81	75	78	85	83	90	99	101	95	92
24	73	69	78	72	75	82	80	87	96	98	93	89
23	70	66	75	69	72	79	77	84	94	95	90	86
22	67	63	72	66	69	76	74	81	91	93	87	83
21	64	60	69	63	66	73	71	78	88	90	84	80
20	61	57	66	60	63	70	68	75	85	87	81	77

TABLE V

Absolute Scale

Otis Group Intelligence Scale, Advanced Examination

Age	13	13.6	14	14.6	15	15.6	16	16.6	17	17.6	18	18.6
No. Cases	93	132	178	201	200	240	250	246	259	249	235	149
Mean	142.2	145.1	148.1	153.8	157.8	162.5	163.7	166.7	169.0	168.5	166.0	165.4
Sigma	29.6	27.3	29.9	30.7	25.4	27.3	30.0	26.5	28.6	26.0	23.8	29.6
Absolute Scale												
80	230	228										
79	227	225										
78	225	222										
77	223	219	228		228							
76	220	216	225		225						229	
75	217	213	222	230	222						226	
74	214	211	219	227	219	229					223	
73	211	208	216	224	216	226		229		230	220	
72	208	205	213	221	214	223	229	226		227	217	
71	205	202	210	218	211	220	226	223	230	224	215	228
70	202	200	207	215	209	217	223	220	227	221	213	225
69	199	197	204	212	206	214	220	217	224	218	210	222
68	196	194	201	209	204	212	218	214	221	215	208	219
67	194	192	199	206	201	209	215	212	218	213	205	216
66	191	189	196	203	198	206	212	209	215	210	203	213
65	187	186	193	200	196	203	209	206	212	208	201	210
64	184	183	190	197	193	201	206	204	209	205	198	207
63	181	181	187	194	191	198	203	201	206	202	196	204
62	178	178	184	191	188	195	200	199	203	200	194	201
61	175	175	181	188	186	193	197	196	200	197	191	198
60	172	172	178	185	183	190	194	193	198	195	189	195
59	169	170	175	181	181	187	191	191	195	192	186	192
58	166	167	172	178	178	184	188	188	192	189	184	189
57	163	164	169	175	176	182	185	185	189	187	182	186
56	160	161	166	172	173	179	182	183	186	184	179	183
55	157	159	163	169	171	176	179	180	183	182	177	180
54	154	156	160	166	168	173	176	177	180	179	175	177
53	151	153	157	163	165	171	173	175	178	176	172	174
52	148	151	154	160	163	168	170	172	175	174	171	171
51	145	148	151	157	160	165	167	169	172	171	168	168
50	142	145	148	153	158	163	164	167	169	169	166	165
49	139	142	145	151	155	160	161	164	166	166	164	162
48	136	140	142	148	153	157	158	161	163	163	161	159
47	133	137	139	145	150	154	155	159	160	161	159	157
46	130	134	136	142	148	152	152	156	158	158	156	154
45	127	131	133	138	145	149	149	153	155	156	154	151
44	124	129	130	135	143	146	146	151	152	153	152	148
43	121	126	127	132	140	143	143	148	150	150	149	145
42	119	123	124	129	137	141	140	146	146	148	147	142
41	116	121	121	126	135	138	137	143	143	145	145	139
40	113	118	118	123	132	135	134	140	140	143	142	136
39	110	115	115	120	130	132	131	138	138	140	140	133
38	107	112	112	117	127	130	128	135	135	137	137	130
37	104	110	109	114	125	127	125	132	132	132	135	127
36	101	107	106	111	122	124	122	130	129	130	133	124
35	98	104	103	108	120	121	119	127	126	127	130	121
34	95	101	100	105	117	119	116	124	123	124	128	118
33	92	99	97	102	115	116	113	122	120	122	126	115
32	89	96	94	99	112	113	110	119	118	119	123	112
31	86	93	91	95	110	111	107	116	115	117	121	109
30	83	90	88	92	107	108	104	114	112	114	118	106
29	80	88	85	89	105	105	101	111	109	111	116	103
28	77	85	82	86	102	102	98	108	106	109	114	100
27	74	82	79	83	100	100	95	106	103	106	111	97
26	71	79	76	80	97	97	92	103	100	104	109	96
25	68	77	73	77	95	94	89	100	98	101	107	93
24	65	74	70	74	92	91	86	98	95	98	104	90
23	62	71	67	71	89	89	83	95	92	96	102	87
22	59	69	64	68	87	86	80	93	90	93	98	85
21	56	66	61	65	84	83	77	90	86	91	96	82
20	53	63	58	62	81	80	74	87	83	88	94	79

TABLE VI

Absolute Scale
Otis Self-Administering Test

Age	13	13.6	14	14.6	15	15.6	16	16.6	17	17.6	18	18.6
No. Cases	69	82	117	128	154	182	228	238	270	256	255	76
Mean	52.1	52.7	50.4	51.2	52.9	55.4	55.4	56.7	58.2	56.2	57.5	52.4
Sigma	11.9	11.5	12.3	12.3	11.6	10.0	10.1	10.7	9.5	8.4	8.8	8.6
Absolute Scale												
80												
79												
78												
77												
76												75
75												74
74												73
73												72
72												71
71												70
70						75				75	75	70
69	75			75	75	74	75			74	74	69
68	74	75	73	73	74	73	74			73	73	68
67	72	73	71	72	73	72	73	75	75	72	72	67
66	71	72	70	71	72	71	72	74	74	71	72	66
65	70	71	69	70	71	70	71	73	73	71	71	65
64	69	70	68	68	70	69	70	72	73	70	70	64
63	68	69	66	67	68	68	69	71	72	69	69	64
62	66	68	65	66	67	67	68	70	71	67	68	63
61	65	67	64	65	66	66	67	69	70	66	67	62
60	64	65	63	64	65	65	66	67	69	66	66	61
59	63	64	61	62	64	64	64	66	68	65	65	60
58	62	63	60	61	62	63	63	65	67	64	65	59
57	60	62	59	60	61	62	62	64	66	63	64	58
56	59	60	58	59	60	61	61	63	65	62	63	58
55	58	58	57	57	59	60	60	62	64	61	62	57
54	57	57	55	56	58	59	59	61	62	61	61	56
53	56	56	54	55	56	58	58	60	61	60	60	55
52	54	55	53	54	55	57	57	59	60	59	59	54
51	53	54	52	52	54	56	56	58	59	57	58	53
50	52	53	50	51	53	55	55	57	58	56	58	52
49	51	52	49	50	52	54	54	56	57	55	57	52
48	50	50	48	49	51	53	53	55	56	55	56	51
47	48	49	47	48	49	52	52	53	55	54	55	50
46	47	48	45	46	48	51	51	52	54	53	54	49
45	46	47	44	45	47	50	50	51	53	52	53	48
44	45	46	43	44	46	49	49	50	53	51	52	47
43	44	45	42	43	45	48	48	49	52	50	51	46
42	42	44	41	41	43	47	47	48	51	49	50	46
41	41	42	39	40	42	46	46	47	50	49	50	45
40	40	41	38	39	41	45	45	46	49	48	49	44
39	39	40	37	38	40	44	44	45	48	47	48	43
38	38	39	36	36	39	43	43	44	47	46	47	42
37	36	38	34	35	37	42	42	43	46	45	46	41
36	35	37	33	34	36	41	41	42	45	44	45	40
35	34	35	32	33	35	40	40	41	44	44	44	40
34	33	34	31	32	34	39	39	40	43	43	43	39
33	32	33	29	30	33	38	38	39	42	42	42	38
32	30	32	28	29	31	37	37	37	41	41	42	37
31	29	31	27	28	30	36	36	36	40	40	41	36
30	28	30	26	27	29	35	35	35	39	40	40	35
29	27	29	25	26	28	34	34	34	38	39	39	35
28	26	27	23	24	27	33	33	33	37	38	38	34
27	25	26	22	23	26	32	32	32	36	37	37	33
26	23	25	21	22	24	31	31	31	35	36	36	32
25	22	24	20	21	23	30	30	30	34	35	35	31
24	21	23	18	19	22	29	29	29	34	35	35	30
23	20	22	17	18	21	28	28	28	33	34	34	29
22	19	21	16	17	20	27	27	27	32	33	33	28
21	17	19	15	16	18	26	26	26	31	32	32	28
20	16	18	14	15	17	25	25	25	30	31	31	27

MINOR STUDIES ON OBJECTIVE EXAMINATION METHODS[1]

II. The Theory of Sampling as Applied to Examinations

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I. SOME THEORETICAL ASPECTS OF THE SUBJECT

Introduction.—One of the prominent claims put forward in support of the traditional written examination of the essay type is that it encourages the pupil to "write himself out" on a number of topics. In doing this he must organize his thought and language in a logical, coherent, and pertinent form. Valuable training in the use of language is held to arise as a by-product of the examination whose principal function is ordinarily taken to be the measurement of achievement.

There is considerable theoretical justification for the view just stated and it is not the intention of this article to decry the value of the essay examination except as logic and experiment combine to indicate certain limitations when the question is viewed in the light of the theory of sampling.

If the pupil is to write fully upon certain selected topics, in contrast with making such short-answer responses as checking and underlining, it is evident that the number of questions which may be set must be comparatively small. In other words, an essay examination lasting one or two hours cannot sample widely. It is forced to take the nature of an *intensive* sampling over a small number of topics. The objective or new-type examinations, on the other hand, may sample *extensively*, i. e., cover scores or even hundreds of narrow topics in the same amount of time. This leaves us with the question of the relative merits of what we have termed *extensive* and *intensive* sampling. Such an evaluation will be attempted both logically and experimentally.

The Logic of the Examination as a Sampling.—We can view any school subject as being made up of a number of major topics or elements. These will ordinarily be broad units of the sort likely to be covered by a question (each) in the ordinary written examination. Within these major units are numbers of smaller topics or elements. The latter are more likely to resemble the narrower type of test exercise commonly em-

[1] For Number I of these studies see Volume XVIII, No. 2 (September, 1928) pp. 112-116.

ployed in objective or new-type examinations. The distinction and analysis which we have just made is of course a relative matter; the exact definition of terms mattering little for present purposes.

Traditional and new-type examinations will be represented by two diagrammatic schemes to follow. In inspecting these the following explanations are needed:

A, B, C, . . . N represent the major topics or elements making up a school subject.

a, b, c, . . . n represent the subtopics falling under each major topic.

Bold-faced letters indicate the topics included in hypothetical examinations of each type, i. e., each letter represents a test item.

SCHEME I

THE CHARACTER OF THE SAMPLING AFFORDED BY THE TRADITIONAL OR ESSAY EXAMINATION

A	B	C	D	E	F	G	H	I	J . . . N
a	a	a	**a**	a	**a**	a	a	a	**a . . . a**
b	b	b	**b**	b	**b**	b	b	b	**b . . . b**
c	c	c	**c**	c	**c**	c	c	c	**c . . . c**
d	d	d	**d**	d	**d**	d	d	d	**d . . . d**
e	e	e	**e**	e	**e**	e	e	e	**e . . . e**
f	f	f	**f**	f	**f**	f	f	f	**f . . . f**
g	g	g	**g**	g	**g**	g	g	g	**g . . . g**
h	h	h	**h**	h	**h**	h	h	h	**h . . . h**
i	i	i	**i**	i	**i**	i	i	i	**i . . . i**
j	j	j	**j**	j	**j**	j	j	j	**j . . . j**
.	.	.	.	.	.	.	.	.	. . . . .
.	.	.	.	.	.	.	.	.	. . . . .
.	.	.	.	.	.	.	.	.	. . . . .
n	n	n	**n**	n	**n**	n	n	n	**n . . . n**

Scheme I shows the intensive sampling of five topics by a discussion question each. The diagram may be extended to represent a 10-question examination. In theory, the pupil must write all that he knows or all that time allows on each major topic. The extent to which such questioning does elicit the pupil's full knowledge will be shown in a future article in this series. Scheme II indicates that the new-type examination attempts to sample all or most of the columns, but not exhaustively. This brings us to two important considerations:

1. The traditional examination sets the general nature of the task for the pupil but within the five or ten designated fields the pupil is free to choose the exact line of attack. In the new-type test the pupil

SCHEME II

THE CHARACTER OF THE SAMPLING AFFORDED BY THE NEW-TYPE OR OBJECTIVE EXAMINATION

A	B	C	D	E	F	G	H	I	J . . . N
a	a	a	a	a	a	a	a	a	a . . . a
b	b	b	b	b	b	b	b	b	b . . . b
c	c	c	c	c	c	c	c	c	c . . . c
d	d	d	d	d	d	d	d	d	d . . . d
e	e	e	e	e	e	e	e	e	e . . . e
f	f	f	f	f	f	f	f	f	f . . . f
g	g	g	g	g	g	g	g	g	g . . . g
h	h	h	h	h	h	h	h	h	h . . . h
i	i	i	i	i	i	i	i	i	i . . . i
j	j	j	j	j	j	j	j	j	j . . . j
.	.	.	.	.	.	.	.	.	. . . . .
.	.	.	.	.	.	.	.	.	. . . . .
.	.	.	.	.	.	.	.	.	. . . . .
n	n	n	n	n	n	n	n	n	n n n n n

must react throughout to what the teacher deems to be of prime importance, and the resulting test paper leaves nothing to the guessing on the part of the teacher as to what the pupil knows or does not know about omitted materials.

2. The extensive sampling of the new-type test is almost certain to be more reliable, in the statistical sense, than is the intensive sampling of the traditional examination. The logical basis for this statement is as follows. Knowledge of any one subtopic in a given column (such as b under A) is more likely to guarantee knowledge of other subtopics (lower case letters) of that column than it is of subtopics in different columns (such as Columns D or N). It follows then that the omissions in any examination, since most of the subject matter taught must be omitted, should not be *entire columns* (as in Scheme I) but rather subtopics in all columns with few or no columns omitted (as in Scheme II).

The literature on examinations is fairly replete with experimental evidence that, for equal amounts of working time, the new-type tests are more reliable than the older forms of examinations. Part of this superiority is to be attributed to the different type of sampling afforded, according to our logic. We shall now turn to an experimental demonstration of the correctness of our *a priori* reasoning.

A Demonstration of the Two Theories of Sampling.—Certain standard tests like the Thorndike-McCall Reading Scale or the Paragraph Meaning Test of the Stanford Achievement Test afford a means of dem-

onstrating the truth of foregoing statements. The Thorndike-McCall test, although not exactly an examination in the sense we have been using the term, is strictly comparable to our two schemes given above.

The following statistical analysis was carried out on a group of 36 sixth grade pupils. Form I was given and the reliability was determined by the method of split-halves "stepped up" by the Spearman-Brown formula. The splitting was done in two ways:

Method A. Odd- and even-numbered items. $r = .76 \pm .055$

Method B. Odd- and even-numbered paragraphs. $r = .65 \pm .064$

A diagram similar to those used below will help to relate results to the preceding discussion. P_1, P_2, . . . P_{11} represent the eleven paragraphs of the test. The numbers 1, 2, ... 35 are the questions as numbered in the test.

SCHEME III

THE SAMPLING SITUATION INVOLVED IN SPLITTING FORM I OF THE THORNDIKE-McCALL READING SCALE INTO CHANCE HALVES

P_1	P_2	P_3	P_4	P_5	P_6	P_7	P_8	P_9	P_{10}	P_{11}
1	4	8	11	14	17	20	23	26	29	32
2	5	9	12	15	18	21	24	27	30	33
3	6	10	13	16	19	22	25	28	31	34
	7									35

Method A placed questions 1, 3, 5, . . . 35 in the half called the "odds" and questions 2, 4, 6, . . . 34 in the half termed the "evens." Method B placed all questions on P_1, P_3, P_5, . . . P_{11} in the "odds" and questions on P_2, P_4, P_6, . . . P_{10} in the "evens." Method A is therefore analogous to Scheme II and Method B to Scheme I. On the average, the questions falling into the halves by Method A are more highly intercorrelated than are those by Method B since in the former case items related to the *same* topics fall at times into different halves, thus increasing the correlation.

The difference in this particular instance is not statistically significant since it is less than twice the probable error of the difference. Nevertheless this experiment has been carried out by the writer and others a sufficient number of times to prove that empirical and logical results are in harmony.

It has been shown that old- and new-types of examinations differ in their underlying theories of sampling. The former is based upon what was termed the *intensive* sample, the latter employs an *extensive* sampling. As the logic of the situation suggests, the extensive sampling is likely to yield more reliable results since the test items actually presented

to the pupils are more highly correlated with omitted subject matter than is the case with examinations made up of a relatively small number of broad questions.

II. EXPERIMENTAL

The second part of this paper turns upon an empirical study of the traditional examination as a device for sampling. Such examinations have been held to be superior to the newer objective or short answer tests in that they reveal the power of the student to handle a topic exhaustively. This claim, although generally conceded, has no basis in demonstrated fact.

When a pupil is asked to "Discuss fully the Monroe Doctrine" what fraction of his knowledge is elicited? Is it all, nine-tenths, three-fourths, one-half, one-third, or one-tenth elicited? It seems that no one knows the answer. Experimentation on this issue is not a very simple matter although a rough approximation to the truth may be had by reasonable care.

An essay examination usually consists of from five to ten rather broad discussion questions. It calls for a maximum of spontaneous recall after limited time for thought. It is to be expected that several things will happen:

1. The pupil will omit important facts or other knowledge.
2. The pupil will insert unimportant materials, either as an attempt at "padding" or through lack of critical insight.
3. The pupil will put down erroneous statements.
4. The pupil will insert correct but irrelevant ideas.

On the whole the first mentioned outcome is the most disturbing since the teacher can only conjecture about the merit of that which is missing. The other sorts of shortcomings can be evaluated with some degree of accuracy. It would be of material value in this age of reform in tests and examinations to have some notion of the effectiveness of a broad discussion question in evoking the pupil's full knowledge of the pertinent facts or skills. The experiment to be described here is a first approximation to an answer.

The Experimental Procedure.—A chapter was selected from some high school or elementary school text which was being studied by a class. As many essay-type questions were framed as proved necessary to cover the chapter thoroughly. The class then took this examination as a routine

procedure except that the working times of each student were recorded. The next day the class took a very long objective test (usually simple recall, multiple-choice, and true-false) which was made up to cover every point of importance in the same chapter. The essay examination papers were scored by a method of counting the separate facts, ideas, or other bits of information. Great generosity was shown the pupil in all cases, the aim being to obtain a count of the *maximum* number of ideas or facts gained through study of the chapter and remembered until examination time. In scoring the objective test the formula, *Score = Rights — Wrongs / (n—1)*, was used.

The following shows the scoring of the essay papers: .... | "Pineda proved that Florida was not an island | by sailing up the Gulf of Mexico as far as Mexico. | Florida was discovered by Ponce de Leon | who was in search of gold and riches | but most of all he was searching for the fountain of youth. | In order that the Spanish and Portuguese would not fight over the new found land, the Pope issued the 'Line of Demarcation'." | Etc.

The vertical lines indicate the analytical count or checking. Two teachers consulted and reached an agreement in all doubtful cases. Credit was given for all answers with any evident degree of merit. Certain other precautions were taken to insure full credit to the pupil but these need not be mentioned as the spirit of the procedure should be clear by now. It might be noted that the score is "5" on the fragment of the reply quoted.

The next step is that of forming a ratio between the scores on the essay and objective tests over the same content. These are recorded in the tabulations as *E/O* values. If a pupil set down half as many facts or ideas on the essay test as he did on the corresponding objective test his *E/O* ratio was .50. Similarly determined time ratios are designated *Te/To*.

Selected Preliminary Results.—Table I shows the principal findings. The highest and lowest ratios are given for individual pupils in each class. The average ratios for each class are also shown. The means of all classes appear at the bottom of the table.

Discussion of the Results.—The admitted limitations of such a rough method of experimentation must be kept in mind in studying the foregoing tabulation. The errors present are due to many causes, principally: (a) small sizes of classes, (b) the fact that but two different schools were

TABLE I

RATIOS OF SAMPLING AND WORKING TIMES

Subject	Sampling Ratios ($\frac{E}{O}$)			Time Ratios ($\frac{T_e}{T_o}$)			N
	Highest	Lowest	Average	Highest	Lowest	Average	
U. S. History I	.84	.37	.51	1.91	.93	1.53	14
U. S. History II	.69	.21	.36	2.40	.91	1.85	20
Chemistry I	.81	.24	.41	2.76	.76	1.90	15
Chemistry II	.64	.22	.37	3.20	.94	1.96	20
Citizenship I	.92	.25	.41	5.18	.77	2.03	18
Citizenship II	.68	.24	.38	2.36	.97	1.73	19
Gen'l. Sci. I	.72	.22	.47	4.07	1.11	3.05	13
Gen'l. Sci. II	.56	.23	.40	2.16	.96	1.70	14
History (Grade 8)	.90	.21	.44	7.30	1.13	3.00	17
Geography (Grade 8)	.98	.28	.66	2.76	.61	1.31	17
Means of Columns	.77	.25	.44	3.41	.91	2.01	

concerned, (3) the factor of subjectivity in scoring the essay papers, and (4) the fact that the sampling ratios depend markedly upon the numbers of items included in the objective tests. The first source of error can hardly be large for the means of the columns. Unpublished data in the position of one of the authors (G.M.R.) which were gathered in several schools in a different state by another investigator agree with the above findings to an extent which makes it likely that the second source of error is not serious. The third danger was compensated for by generosity in scoring the essay papers. The fourth source of error is, on the whole, the most disturbing, viz., the fact that throwing a large number of trivial elements into the objective tests would force down the ratios of sampling. Every effort was made to avoid this error and present results are probably conservative in the sense that the pupils really knew more items of information than our objective tests included.

Conclusions—With these limitations of method in mind we can turn to the values in the row of means of the columns. The following statements will serve as a summary.

1. On the average the essay question calls forth less than half of the pupil's knowledge; two-fifths being a closer estimate.

2. The sampling varies between approximately one-fourth (.25) and three-fourths (.77) as the average range.

3. The essay examination requires approximately twice as much time as the objective test for a given unit of subject matter, if the unit is treated exhaustively.

4. Since the essay examination requires twice as much time and evokes less than half as much knowledge, the objective test is from four to five

times as efficient as a device for sampling. This will probably hold only for factual tests like the present ones, and even then very roughly.

5. Judging from the values in the "Highest" column, an occasional pupil tells all he knows when told to "Discuss fully" some topic.

6. The values in the "Lowest" column suggest that in extreme cases the broad discussion question elicits from one-fifth to one-third of the pupil's knowledge.

7. These data would seem to indicate that the discussion question is not as effective in evoking a pupil's full knowledge as has commonly been supposed. If a pupil writes one-fifth to three-fourths of his real accomplishment on his examination paper, the teacher must base a goodly portion of her mark on "the substance of things hoped for, the evidence of things not seen."

EDITORIALS

THE ORGANIZATION OF SUBJECT MATTER

The educational world has witnessed during the last decade tremendous activity in the field of curriculum construction. The traditional curriculum has been examined and reëxamined from almost every imaginable point of view. The objective has been better selected subject matter. Analyses of the activities performed in everyday life have been made and the essential knowledges, skills, attitudes, and ideals determined; analyses of courses of study, textbooks, and current periodicals have been made and the essential items of content set forth; studies of the opinions of experts, teachers, principals, supervisors, and others have been made and composites of various sorts prepared. The objective has been scientifically selected subject matter.

There is, however, notwithstanding the very excellent contribution of all of this work toward the improvement of present-day teaching, another aspect of curriculum construction which is quite as important as the selection of subject matter and which needs more attention than it has yet received, namely, the organization of subject matter for teaching purposes. As a matter of fact, the way that subject matter is organized frequently determines whether or not it is learned. This field of research seems to be somewhere between the psychology of learning and of teaching on the one hand, and the selection of subject matter on the other. It is sometimes regarded as an aspect of curriculum making and sometimes not so considered.

There are in this field many traditions and theories about how subject matter should be organized. Dewey, sometime back, pointed to the ineffectiveness of logically organized subject matter and recommended psychologically organized subject matter. Out of his discussions grew the discussions of the activities-curriculum and its merits as compared with a subjects-curriculum. Other aspects of this discussion have had to do with incidental vs. direct methods of instruction, functionally taught subject matter, etc. Morrison and Miller have recently raised the question of the size of the teaching unit, out of which has grown the

discussion of daily assignments vs. unit assignments. This is a problem of organizing subject matter. Traditionally one proceeds from the simple to the complex, and from the concrete to the abstract. There was a time when one heard much of inductive and deductive methods of teaching. These are all problems pertaining to the organization of subject matter. They need careful attention.

I suppose that if one defines the object of education as the progressive reconstruction of experience as Dewey does, one would probably first ask in approaching the study of this field: What is experience? Then, one might want to know how individuals with experience differ from individuals without experience. There are, also, different modes of getting experience. One may get experience: (a) through direct participation; (b) through observation; (c) through reading and oral report; and, (d) through reflective thinking. Professor Bobbitt lists eight of these. One should probably also like to know something of the characteristics of the experiences gained under each of these systems and how each might be used most advantageously in getting an education. If one followed out this idea and organized the curriculum on an activities basis he should probably want to study it from the standpoint of its interest value, its contribution to concomitant learnings, its effects on learning and forgetting, provisions for individual differences, and the transference of training to other activities. He probably would be interested in the product as evaluated from the intellectual, physical, social, ethical, and emotional points of view. Of course, one might take the point of view that the best way to get an education is to study the organized presentations of subject matter usually found in textbooks. This, too, should probably be subjected to experimental investigation.,

I have selected for elaboration here merely one problem in the organization of subject-matter. We have expended, and rightfully so, a great amount of effort on the selection of subject matter. We need to give more attention to the organization of subject matter. An important difference in these two efforts lies in the educational need of mastery of each step with reference to the requirements of succeeding steps through the school course. A. S. B.

REVIEWS

Address all communications relative to book reviews to Editor E. J. Ashbaugh, Miami University, Oxford, Ohio.

REALS, WILLIS HOWARD. *A Study of the Summer High School.* Monograph 337, Contributions to Education. New York City: Teachers College, Columbia University, 1928. vi + 88 pp.

The book is divided into eight chapters, in each of which the purpose of the investigation covered by the chapter is clearly set forth. This is followed by a statement of the procedures used and the tabulated data secured. Each chapter ends with a summary of the conclusions. The style is clear and concise, the procedures modern and scientific, and the conclusions are definitely stated, with the reasons, therefor, clearly indicated.

This study of summer high schools is not concerned with matters of organization or administration. On the other hand it attempts five things:

1) To trace briefly the development of the public summer high school and to show its relation to the vacation school, the summer elementary school, and the all-year school.

2) To study the quality of work which summer high-school pupils do as measured by certain achievement tests, and to compare their work in the summer school with that of pupils in the regular academic year.

3) To study ability of pupils who receive promotions at the end of the summer session to sustain themselves in advanced work during the succeeding academic year.

4) To study the summer school pupil personnel in a large summer high school.

5) To study the ways in which regular academic pupils spend their summer vacations, in order to show the probable demands for summer schools.

In tracing the development of summer high schools, the fact is emphasized that in 1841 the public school term, in the larger cities, had a length of forty-four to forty-nine weeks. Later, throughout the country, the school term gradually was shortened until in 1915 it varied from thirty-six to forty weeks, or, exclusive of holidays, from 178 to 193 days.

Private initiative started vacation schools in larger cities to take children off the streets during the long summer vacation. This work later was taken over by boards of education. In recent years summer high schools have grown rapidly in number and enrollment, the latter increasing from 58,000 in 1921 to 111,000 in 1926. Some summer high schools are free and others are on a tuition basis.

In comparing the quality of work done by pupils in summer high schools with that accomplished during the regular school year, an intensive study was made of achievements and pupil personnel in two high schools, one the Oswego (N.Y.) High School and the other the Washington Irving High School in New York City. These are satisfactorily representative of small and large high schools in New York state. In order to safe-

guard the results secured and the conclusions reached, Terman Group Tests of Mental Ability were given the pupils along with subject achievement tests. The results indicate that summer high school pupils in general have higher achievement scores than those of pupils during the regular school year, providing those compared have the same mental ability as shown by Terman Mental Ability Tests. The author suggests that this is probably due to:

1) Intensive work upon one or two subjects only.

2) Voluntary attendance; only those attending summer school who have a purpose in going, either to make up failure or to shorten time to graduation.

3) Extra-curricular and other activities or diversions do not have opportunity to take the time and attention of pupils.

A study of the way high-school pupils spend summer vacations, made at the Morris High School, New York City, shows that 28 percent of the enrollment during the regular term were in summer high school in 1927. Less than one-fourth of the pupils of the regular school year were employed for the entire summer and about one-fourth were employed part time. More might have worked had it not been for employment laws. The author believes that more pupils can and should attend summer high school and that the latter will continue to grow in attendance. This should be encouraged by school authorities since the costs of summer high-school instruction is considerably less than that of the regular school year.

The general application of the conclusions reached from the study are subject to question, since they are based upon conditions and results found in but two high schools in New York State. However, the personal experience and data in the office of the reviewer, who has been District Superintendent in Charge of Summer High Schools in Chicago for the past four years, confirms the general observations and conclusions reached in this research. While each city and school will have conditions and results giving specific variations from those reported on in this study, yet the basic conditions and conclusions reported have general application. This research should be of value to those considering the establishment or expansion of summer high-school work in any portion of our country, and also, those interested in the results of a careful study of the value and thoroughness of work done in summer high schools.

Chicago, Ill. WILLIS E. TOWER

MERCIER, L. J. A. *French Pronunciation and Diction.* New York: Silver, Burdett and Co., 1929. xii + 156 pp.

This is a carefully prepared book, showing thorough scholarship and a sound knowledge of the subject. Professor Mercier has drawn deeply upon his years of successful experience as a teacher at Harvard and Radcliffe and has produced a book with many interesting features in connection with the teaching of French pronunciation, which, he says (p. vii), "should be the first concern of the teacher of a modern language." He realizes that the student will pronounce the words to himself, even while writing, and if not well, then ill. Some kind of speech reactions he will surely make. Moreover, Professor Mercier rightly says: "The test of great literature is oral interpretation, and through oral interpretation only can great literature be adequately appreciated" (p. x). Thus from every angle a good pronunciation is essential.

Professor Mercier knows well how necessary, in acquiring a good pronunciation,

is constant repetition with a view to good habit formation (p. 2). Here also one may know, and yet for a long time not do, or at best do only sporadically. Mistakes must be isolated, corrected separately and then in their context (p. 6), and this process must be repeated and repeated unweariedly until relative perfection is attained. Professor Mercier aims high. He is not content with American approximations, but devotes all of Chapter IV to an "Analysis of Defects Natural to Americans in Pronouncing Connected French." This is one of the most important and useful parts of the book, and should be carefully studied by every teacher of French who has not already been instructed along these lines. It should be of particular aid to those native teachers who, through lack of phonetic training, are unable to understand the particular type of difficulties encountered by American students.

Special attention should be called also to the instructions for grading pronunciation (p. 9), to the short pronunciation test (p. 49), and above all to the Pronunciation Record Card (pp. 58-59). This last is a capital idea and should be utilized in this, or in similar form, in all classes where pronunciation needs to be stressed. An Index of Words Offering Special Difficulty (pp. 145-153) is another excellent feature.[1] The latter half of the book gives much attention to diction and offers numerous selections for the reading of connected French.

The only questions in the reviewer's mind in connection with this generally excellent and suggestive book is whether the rules for the spelling of French sounds (pp. 60-89) are not unnecessarily complicated and difficult for the student to master and whether the effectiveness of the book for class use would not be greatly increased by division into lesson units with definite pronunciation exercises in each.

GEORGE R. HAVENS
Ohio State University

COLEMAN, ALGERNON. *The Teaching of Modern Foreign Languages in the United States.* New York: The Macmillan Company, 1929. xx + 299 pp.

This is Volume XII of the Publications of the American and Canadian Committees on Modern Languages. In it Dr. Coleman has brought together evidence bearing directly on his topic from preceding volumes in order that the reader may see clearly the evidence upon which the conclusions are based. He presents first the objectives of modern language instruction, then the content of the modern language course, the organization of classes, and finally some considerations in regard to method.

On the basis of all the evidence available a revised list of objectives were compiled with a clear differentiation between immediate and ultimate objectives, both for two year courses and for courses of three and four years in length.

Reading ability is the one objective which received unanimous endorsement and consequently the majority of the committee reached the conclusion that more abundant and more attractive reading material should be provided. Emphasis should be placed upon extensive reading, rather than upon detailed analysis of a limited amount.

The suggestions under Organization of Classes and Class Room Method are highly suggestive and when applied by teachers of training and initiative should result in improved achievement. The presentation of data is clear and concise,

[1] *Granit* is here listed with silent *t*, though on p. 84 is given the probably more frequent pronunciation with *t* sounded. *Mœlle*, given [mwel], would be better as [mwal].

the interpretation carefully limited in terms of the evidence presented.

NATIONAL COUNCIL OF TEACHERS OF MATHEMATICS, The Fourth Yearbook, *Significant Changes and Trends in the Teaching of Mathematics Throughout the World Since 1910.* New York City: Teachers College, Columbia University, 1929. x + 186 pp.

We often hear of the differences existing between the European schools and the schools in this country. Likewise it is often stated that the trends of European schools influence our curricula and courses of study. It is therefore a most opportune time for teachers of mathematics to have at their disposal such a book as the Fourth Yearbook of the National Council of Teachers of Mathematics. The Yearbook gives a brief summary of the important trends of mathematics in the major countries of the world. The countries represented are: Austria, Czecho-slovakia, England, France, Germany, Holland, Hungary, Italy, Japan, Russia, Scandinavia, Switzerland, and the United States.

The papers covering the various countries were written by the best available authorities of the countries represented, and clearly bring out the major differences in the modes of instruction and subject matter content of these countries. Not only is the foregoing true of the present day situation but also the causes leading up to these changes, covering the period since 1910. The papers were translated by Miss Vera Sanford of Teachers College, with the exception of the one written on the United States which was prepared by Dr. William Reeve of Teachers College. No teacher of mathematics can afford to be without a copy of this Yearbook if he expects to keep abreast with the latest developments in the field.

F. N. WERREMEYER
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KITSON, HARRY D. *Commercial Education in Secondary Schools.* New York: Ginn and Co., 1929. vii + 374 pp.

There are at least two main objectives to be accomplished in graduating a pupil from a Commercial Course,—first, how he is to earn his living, and second, how he will think about the ultimate problems of life and society. Society is vitally concerned in both of these objectives because the thought and the actions of the business man is society's chief asset.

The kind and quality of a business man's thinking and mental attainment have as much, if not more, to do with his ultimate social efficiency, business success and personal happiness as his technical training. How to transmit the force of individual opinion and preference into community action be it shop, factory, or mercantile house, is the most difficult problem and requires a quality obtained only by a trained mind.

Commercial Education, in the generally accepted sense in the past, has been a purely vocational process. The present tendency, however, is towards a broader outlook and a better training for the general field of business activities. This text emphasizes the best present day objectives of commercial education and the principles of education which underlie them.

The author of each subject has clearly stated his conception of the newer and better ideals of commercial education and the place it should occupy in the great field of general secondary school education.

The high order of content and material has convinced the writer that it is the most outstanding book of the day in the field of commercial education.

IRVING R. GARBUTT
Cincinnati Public Schools

JOHNS, ROE LYELL. *State and Local Administration of School Transportation.* New York City: Teachers College, Columbia University, 1928. ix + 134 pp.

This study suggests a measure of school transportation need and a method of administering State aid for transportation. Sections of the study are also devoted to a detailed analysis of plans used in Florida together with costs and administrative procedure. For the practical administrator, the value of the study is increased by the inclusion of material indicating the liability of boards of school directors for transportation accidents, and a system of cost-accounting to aid in developing an efficient system of transportation.

The problems presented by the study are two-fold,—to measure a community's need for transportation in terms of pupils to be transported, and to approximate the cost of such transportation.

The percentage of pupils in a given area to be transported is discovered by the fitting of the function $Y = \frac{A}{X + K + B}$ to actual percentages transported, as related to density in average daily attendance, by the method of approximation or least squares. The formula $\tilde{Y}p = \frac{57.4704}{X + 2} + 1.8571$ ($\tilde{Y}p$ = percentage of pupils to be transported, X = density in average daily attendance per square mile) is derived and presented as a valid predictive index of the percent of pupils to be transported. It is assumed, and data were submitted to substantiate the conclusion, that the density of population can be considered as the summation of the varying factors on cost.

In like manner the formula for cost is derived as $\tilde{Y}c = .38396X + 53.06$ for values $X = 0 - 68.9727$; and $\tilde{Y}c = .04634X + 23.381$ for values $X = 68.9727 - 165.5$, all values of X above 165.5 being considered as 165.5 (in this formula $\tilde{Y}c$ = yearly cost per pupil in average daily attendance; X = density in average daily attendance per square mile.)

Where a unit other than the county is used, it is suggested that the formula be used for the county and funds allocated to local units by applying the formula to these units. It is further suggested that transportation aid be distributed in combination with other elements of need, on the basis of the community's tax paying ability. This is to be done by dividing the State aid allowed by the cost per weighted pupil as determined by Mort's technique and summing with other elements of need.

Assuming the validity of the formula, the following simple operations give the cost of a minimum program:

$\tilde{Y}p \times$ average daily attendance = number to be transported.

$\tilde{Y}c \times$ number to be transported = cost of transportation.

In administering the program, it is suggested that if the result is less than the present cost, allow only the amount determined by the calculation.

The validity of the predictive value of the formula was checked against actual cost data in the States of Alabama, Connecticut, Florida, New Jersey, and Pennsylvania. The predictive value for these states was high, leading the author to conclude that it can be applied to other states with fair success. Each state should, however, determine the formula

for its own minimum program. The amount above the minimum which an individual state wishes to contribute can be raised when desirable.

Transportation is becoming an increasingly important item in the general program of education. There are many unsolved educational and economic questions relating to transportation. On the other hand, any comprehensive state program of education must include transportation. This study is important in that it suggests a method of attack which may be adapted to other studies.

WILLIAM H. BRISTOW
Pennsylvania State Dept. of Public Instruction

RUGG, HAROLD AND SHUMAKER, ANN. *The Child-Centered School.* Yonkers-on-Hudson, New York: World Book Company, 1928. xiv + 359 pp.

The Child-Centered School is a particularly good antidote for readers of the *Journal of Educational Research.* Those of us who spend a large part of our time delving into partial correlations, regression equations, S.D.'s, and such like attempts at exactitudes, need to know about the intuitive thinking and imaginative undertakings of our more artistic brethren—and sisters. Rugg and Shumaker take pains to tell these child-centered folk that they need to make more use of science and technique (as they certainly do), but the book is, on the whole, a sympathetic—indeed, an exclamatory!—account of the attempts of a number of private schools to carry out the philosophy of Parker, Dewey and Kilpatrick.

The traditional school is frequently contrasted with the child-centered school to the detriment of the former, as for instance:

"Guided by rote and routine, the child's mind is submitted to the grindstone of an educational discipline which forever dwarfs his capacity to think for himself, which dulls his interest in gleaming, pulsing life. Small wonder that the indignant protagonist of the new school rebels against this regime which, says he, 'reeks of restraint and suppression and the inarticulate child. .....

"For the new school is a child's world in a child's-size environment. Here he lives in a democracy of youth. His needs, his interests, as well as adult insight concerning his future life, determine what goes on in this school. And if the visitor be one who has not forfotten his own childhood; if he be one who can luff a block boat with the best; who can shop with aplomb in the streets of a play city; who at the mere sight of a fringe of feathers, a skull-'n'-crossbones, or a miniature Conestoga feels within himself the wild life-surge of a Red Indian, a Black Pirate, or a sturdy frontiersman—such a one may well view with delight the whirl of activities unfolding panoramically before him."

The gap between the traditional school and adult life, on the one hand, and that between the traditional school and child life, on the other, is well shown. The attempt of the child-centered school to fill the second gap is the burden of the book. That the scientific movement in education is an attempt to fill the gap between the school and contemporary adult life is not, singularly enough, made clear. The results of its "efforts have been mere supervisory makeshifts," and have "made relatively little impress upon either the activities of the school or the fundamental theory of its reconstruction." Yet the scientific movement is sketched, and in the latter part of the book, its techniques are urged upon the artist-teachers of the "new schools."

The history of the child-centered school in America is impressionistically—and interestingly—traced; its articles of faith are stated and restated.

Then typical programs are given of the "new schools" and the traditional ones. "New school" curricula are described in some detail. The Lincoln, Walden, and City and Country School in New York, and Francis Parker in Chicago, furnish most of the concrete examples, with occasional reference to the Ethical Culture School in New York, and the Ojai School in California, and allusions to a few others. From this background the authors proceed to four chapters of criticism.

Question is raised as to whether, in some child-centered schools, too much of the program is not left to the chance, unguided interests of children. Furthermore, "the lack of design in the program as a whole," comes in for well-merited criticism: "In none of these schools has the staff, working as a team, designed a really integrated program of work. In none have the teachers visualized the program of the entire school in constructing the program of any year. Our study is convincing that the curriculum for each grade or class has grown up from unit to unit without adequate design, almost without recognition of the learning that has taken place in preceding years or units. Certainly there has been no clear definition of the end-point of education in post-adolescent years or of the successive stages that the pupils still have to pass to reach that goal."

The authors, continuing their criticism, point out that: "There are two factors in the educative process. One, the child—a jumble of growing needs and interests and of a wide range of potential abilities; the other, adult civilization—an intricate and well-nigh incomprehensible composite of economic, political, and social institutions. Both these factors—American civilization and child life—must be clearly comprehended and provided for in any sound theory of education. Either one, taken alone, will produce a lopsided scheme."

The final criticism is that the child-centered schools "not only have had too little respect for ideas and systematic training in thinking, but in addition they have seriously neglected to apply the well-known findings of our contemporary psychology of practice."

The reviewer heartily endorses the authors' statement at the close of the critical chapters: "The curriculum is composed of a wide variety of learning activities. Many children will be as interested in puzzling out intellectual situations as in hammering and sawing; some, much more so.

"This fact brings up difficult general suggestions concerning the most desirable conditions for learning. Would not children grow more completely in a given amount of school time with a curriculum made up, on the one hand, of a combination of dynamic activities and, on the other hand, of a minimum of carefully planned practice exercises, partly child-centered, partly adult, but always of real interest to the pupils? To guarantee maximum growth in tolerant understanding, are we not obligated to plan in advance the activities and materials of instruction—to adopt a program of planning in advance?"

The remainder of the book is largely given over to an interesting, illustrated description and discussion of the role of rhythms, creative work in making musical instruments and composing simple melodies, self-expressive art and writing, and creative dramatics, in child-centered schools. Toward the end there are a few

chapters on the psychology of the creative art, the individual and creative group life and the physical setting of the new school. The final critical retrospect draws the book to a well-balanced close.

As a whole, the book is thoughtful and thought provoking. It is interestingly written. It is a distinctly valuable and timely contribution to the literature of contemporary educational theory and practice.

C. W. WASHBURNE

Winnetka, Ill.

COALE, WILLIS BRANSON. *The Professional Needs of Teachers of English.* New York City: Teachers College, Columbia University, 1928. 85 pp.

This is a careful and competent questionary study which usefully supplements Miss Jewett's *English in State Teachers Colleges*,[1] a catalogue study, and that of Miss Inglis.[2] After an analysis of previous work and a summary of current thought on essential preparation of the English teacher and on recognized objectives, as contained in the standard books and articles on the teaching of English, the procedure of the author was to collect by questionary the judgments of teachers of English concerning useful elements in their college training, concerning objectives in the teaching of English, and, from another angle, concerning necessary items of preparation for their practical needs. On this basis the writer worked out a professional teacher-training program in English by hours, which comprised one-third of the four-year period of training, including courses in subject matter and courses specifically in the teaching of the subject. He indicated also a group of related courses "considered essentially supplementary to the course subjects."

Both the usefulness and the limitations of this kind of study are quite apparent. No doubt it was of value to know, in addition to such summaries of actual practice as Miss Jewett presents, what various people, including particularly the teachers actually engaged in it, think of their preparation and of its possible betterment. As usual in such studies, a very careful attempt was made to secure the judgment of successful teachers of English, in both the junior and senior high school, who were widely distributed geographically. It is curious that although distributions are given of the number of English teachers in the high schools represented, and the number of years of total teaching experience for each teacher, there is no distribution or statement, apparently, as to the years of preparation of each teacher. The proportion of normal-school and of college graduates is given but this does not tell the whole story.

With the care shown in the selection of coöperating teachers, then, it is clear that Dr. Coale has secured a picture of opinions of reasonably satisfactory teachers of English as to the best preparation for the work in their subject. The limitations of this method must not, however, be overlooked. For example, emphasis on "the interpretational objective," in which Dr. Coale includes "skill in both oral and silent reading and occasionally....effectiveness in listening" is comparatively infrequent in the standard of literature on the subject which Dr. Coale examined. Likewise, the "leaders of thought" whom he followed rarely mention the necessity of "knowledge of the history and theory of language." As a result, though "ability in oral read-

[1] Teachers College, contributions to Education, No. 286. 1927.

[2] Inglis, Rewey Belle, "The Minnesota Study of Teachers' Preparation," *English Journal*, XVI (Jan. 1927), pp. 60-61.

ing" appears among the items of "the greatest possible usefulness" to teachers (p. 40), knowledge of how to study or get meaning is altogether missing from that list. But in deference to recent agitation, "skill in silent reading" appears among the chief aims of English (p. 44). Likewise, according to the judgment of the coöperating teachers, among the chief items in the equipment of the English teacher, "history of the language and knowledge of theory of language" do not appear at all (p. 57). As a resultant anomaly, among the essential supplementary subjects listed by Dr. Coale (p. 64) Latin (on the assumption of no high-school preparation in the subject) is given a suggested fifteen hours, whereas principles of language, "which includes grammar, the teaching of grammar, and history of language" have altogether two hours in the English teachers' course (chart p. 60)! Contrast with this the suggestions of the Committee on Training of English Teachers of the National Council of Teachers of English.[3]

In other words, what we find scantily mentioned in the standard books on the subject fails to appear at all in the teachers' summary of first essentials. The led are appreciably behind the leaders.

If we are to follow the judgments of teachers who are prepared under what Dr. Coale calls, and Dr. Jewett has well proved to be, "a most haphazard system," it is at least possible that our leadership may be backward instead of forward. All that a questionary study can possibly hope to do is: (1) to give a more or less accurate picture of existing conditions, and (2) to assemble the judgments of more or less competent persons as to possible policies. Comparison is inevitable with Dr. Pendleton's tremendous and laborious study of 1589 objectives in English.[4] The foremost objective of all, according to the judgment of carefully selected successful teachers, was "the ability to spell correctly without hesitation all the ordinary words of one's writing vocabulary."

It is time to distinguish sharply between (1) fact-gathering, (2) the determination of a few large philosophical objectives (which will obviously be so general, as Dr. Bode has pointed out, that everybody will agree with them and no particular harm or good be done by them), and (3) the determination of specific details, which can only be arrived at in actual investigation of what happens in specific circumstances. Dr. Coale might well have provided for this necessary continuation of his study in his list of "Further problems needing solution," (pp. 66 and 67). For example, he has suggested as one of his useful "principles and policies" that "student progress and achievement are (rather, should be) measured in terms of demonstrating practical mastery of needed professional equipment" which is the only way this or any other specific matter of attainment can be measured; but his "further problems" suggest nothing whatever of the sort, as if implying that the extension of his procedure is sufficient to solve all problems of teacher-preparation.

It is to be hoped that the day of the free and unlimited solution of everything by questionnaires is about over, and that careful distinctions will be made in future studies as to what can and cannot be done by this method. Nevertheless, Dr. Coale has presented a careful and useful picture of what is now thought about

[3] "Training in English Language for English Teachers" *English Journal*, XVII, No. 10, College Edition, December, 1928. Committee composed of Samuel Moore, Leo T. Rockwell, W. F. Bryan, C. C. Fries, J. S. Kenyon, T. A. Knott, R. L. Ramsay, J. F. Royster.

[4] Pendleton, C. S. *Social Objectives in English Composition*, published by the author, Nashville, 1924.

what now is, and we can use it as a basis for proceeding to find out what ought to be.

STERLING A. LEONARD
University of Wisconsin

BURCH, MARY CROWELL. *Determination of a Content of the Course in Literature of a Suitable Difficulty for Junior and Senior High School Students.* Worcester, Mass.: Genetic Psychology Monographs, Volume IV, Numbers 2 and 3, Clark University, 1928. 168 pp.

The enjoyment of the books read and studied each day is becoming more certainly the desideratum in literature instruction. Unless we actually arrange the course of study in such a manner as to attain this end it would probably be better not to attempt to teach appreciation. One of the stumbling blocks in the way of enjoyment of literature is that of reading, for, if the child cannot read smoothly and easily the material before him, how can he enjoy it very much? It is this problem of the reading difficulty of the selections regarded as desirable which has been attacked in the present study.

The general procedure utilized in the present study in constructing a reading test based on paragraphs taken from selections used in high school is discussed in the following paragraph.

The values of teaching literature were secured from the reports of our best committees. The next step was to discover from the printed courses of study of several large California high schools what selections in the high-school courses of study taught these values and what was the grade location of each. In this manner, three groups of selections were made dealing with narration, emotions and character portrayal, and exposition respectively. One paragraph from each selection was chosen to represent that book or poem in the test. Great care was exercised in making certain that the paragraphs used were representative. Questions with multiple choice answers were used in connection with each paragraph. This test was submitted to teachers of English for criticism and was tried out in a preliminary way with the students of a small high school, and afterwards used with a much larger number.

By means of these tests it was discovered that the range of ability in each grade is great; that the selections in the present course of study are suited to the reading ability of about 25 percent of the class, and that the amount of overlapping between grades is enormous. Furthermore, the difficulty value of about sixty selections was determined by these tests.

This is an excellent study: the technique is adequate; the problem is clearly defined; the results are adequately checked. In spite of such excellence, however, one wonders if one paragraph could possibly be representative of the reading difficulty of a whole book.

A. M. JORDAN
University of North Carolina

JORDAN, A. M. *Educational Psychology.* New York: Henry Holt and Company, 1928. xiv + 460 pp.

Professor Jordan divides his treatment of the problems of educational psychology into four parts: learning the school subjects, individual differences, measuring mental traits, and learning habits of conduct. In Part I he discusses inherited nature, principles of learning, conditions of learning, laws of learning applied to the elementary subjects, how to study, and transfer of training. A description of methods of collecting data in the first chapter might well have included the

case-study method in view of subsequent discussions of the family and the maladjusted child; in these later chapters is found a great deal of information collected by the case-study technique. Part II includes treatments of statistical methods, individual differences, and the family and environment. Part III is concerned with the measurement of intelligence and achievement. Part IV includes two chapters dealing with discipline and the maladjusted child.

In the preface the author expresses his indebtedness to his teachers—Thorndike, Woodworth, and Judd. The type of treatment employed, however, indicates the influence of the first two psychologists rather than the last mentioned. In the index are twenty-two references to Thorndike, five to Woodworth, and only one to Judd. It is true that the numerous applications of psychological principles to the school subjects show rather clearly the influence of Judd's work and teaching. There is little evidence that the author has been influenced materially by Judd's emphasis on the social products of human intelligence such as tools, money, number, punctuality, the alphabet, language, music, religion, art, and government. The comparatively large amount of space given to heredity and original nature, the bond theory of learning, and individual differences indicates clearly the great influence of Thorndike. The author is to be commended for omitting the all too frequent discussions of structural, sensory, and introspective phrases of psychology. A question may be raised concerning the desirability of two chapters on the transfer of training. The treatments of how to study and of maladjustment are well worth the attention of the student of education, and have been frequently omitted from the educational psychologies of the past.

Certain comments should be made concerning the mechanical features and editing of the book. In many instances the author does not cite in footnotes an exact identification of the source of data given in the body of the text, although as a rule the references covered in a given chapter are listed in the chapter bibliography. The references in the bibliographies are incomplete in that the names of publishers are lacking. In some instances the alphabetical arrangement of authors is not followed out consistently. No lists of the forty-six tables and forty-six figures have been provided. Many of the tables and figures have unusually long and heavy headings, for example, ten lines on page 235. This difficulty could have been avoided in most instances by placing explanatory material in footnotes or in the text instead of in the table or figure headings.

The author's chief contribution is in bringing together a considerable amount of recent experimental and statistical material. A rough count of the numerous references cited in footnotes and bibliographies indicates that seventeen have 1926 as date of publication, seventeen have 1927, and two have 1928. He has also been more fortunate in his selection of topics than many writers in educational psychology.

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RESEARCH ABSTRACTS and BIBLIOGRAPHIES

Address all communications relative to research abstracts and bibliographies to Editor A. S. Barr, University of Wisconsin, Madison, Wisconsin.

BUSEMAN, ADOLF. *Pedagogical Knowledge of Environment* (Pädagogische Milieukunde) Halle a. S.; Schroedel, H., 1927.

This investigation attempts to develop systematically the relations between environment and education. In the first part of the work the working concepts and methods pursued in the investigation are presented. In the second part an attempt is made to give examples of different pedagogical environments. The author finds that "imitation" and "suggestion" are the most important factors in the relation of human beings to environment. The following environmental types are presented: Family-home-environment, city and rural environments, and for each type is shown its influence of mentality and mental development. The final chapter points out that "care", "adaptation" and "education" are important stages of all nurture.

A Five Year Building and Future Sites Program, Milwaukee: Board of School Directors, 1929.

This bulletin contains a summary of the school building situation in Milwaukee, school policies, probable growth of Milwaukee, the new building program, and the future sites program. The discussion is supported by 11 tables and 13 figures.

Fourth Bibliographical Booklet, Complete Bibliography of Pedagogy (Die erziehungswissenschaftliche Forschung). Pädagogische Gesamtbibliographie, Heft 4. Academy of Sciences of General Utility at Erfurt. Section for Education and Adolescence. (Academie gemeinnütziger Wissenschaften zu Erfurt. Abteilung für Erziehungswissenschaft und Jugendkunde). Edited by Arthur Hoffman, Erfurt: Stenger, K., 1929.

An abstract of the first, second, and third booklets was published by the *Journal of Educational Research* in October, 1928, p. 254. The fourth bibliographical booklet contains the following sections: The German educational book publications of 1927, second half year, compiled by Werner Diedrich, Berlin; the German educational treatises and articles of 1927, second half year; bibliography of the total periodical literature in the German language, compiled by Else Beilig and Werner Diedrich, Berlin; the German university publications on education of 1927 and 1928 with supplements of 1924, 1925, and 1926; pedagogical bibliography of dissertations, compiled by Kurt Gassen, Greifswald; education in Research and Teaching in universities, technical "Hochschulen", and pedagogical institutes of the German language territory; summer, half year 1928, compiled by Else Beilig, Berlin; the study of the "Pedagogical Academies" of Prussia; summer, half year 1928; a survey based on official communications.

JAEK, P. *Education and Physical Performance* (Gesamterziehung und körperliche Leistungsfähigkeit) Langensalza: Beyer & Sohn, 1928, 94 pages.

In this questionnaire study of 1,512 athletes, participants of the German Academical Olympia 1924 and 1927, the author investigates the influences of home, school, and university, social position, age, alcohol, nicotine, etc., upon athletic performance. Conclusions are drawn relative to the effect of physical training received in different types of schools.

LÖFFLER, J. *The Structure of the Public School System in Germany.* (Der Aufbau des öffentlichen Schulwesens in Deutschland) Berlin: Mittler, (1928), p. 172.

Reviewing the fundamental principles of the new German educational reform as laid down in the "Federal School Conference" in 1920, the author treats successively the different types of schools, such as Volksschule, Mittelschule, secondary school, vocational, and industrial schools. Besides these topics, equipment, curriculum, method of instruction, and for the elementary school denominational conditions are treated. The different school situations in the various German states are systematically surveyed, and the official documents cited.

MÜLLER-JUNG, ANNA. *School Knowledge and Skill of School Graduates.* (Schulmässiges Wissen und Können bei Schulentlassenen) Berlin: Union Deutsche Verlagsgesellschaft, 1929, 76 pp.

One hundred-twenty graduates of elementary and vocational schools were tested with about 130 questions out of the elementary school curriculum. One year after graduation only 50 percent of the knowledge was retained. There was not found, for any of the school subjects, general and sure knowledge. In those cases where there was little demand for thinking and where the solution of the problems were obvious, positive results were obtained. The ability to represent briefly a complete statement of a paragraph read, was performed perfectly by one-sixth of the pupils. Little ability was shown to distinguish between the essential and the non-essential.

Pupil Progress Through the Grades as Shown by Age-Grade Distribution, Department of Educational Research and Service, San Francisco Public Schools (September, 1929).

This mimeographed bulletin gives the distribution of pupils according to age and grade, with tables covering the range of ages for grades one to twelve, the percentage of pupils accelerated, at grade and retarded, for each half-grade, for elementary schools, junior high schools and senior high schools.

Research Bulletin of the National Education Association. "Vitalizing the High-School Curriculum," vii, (September, 1929).

This bulletin discusses the following topics: education for a changing civilization; curriculum building for pupils of different levels of ability; research in secondary school subjects, including Modern Foreign Languages, Latin, English, social studies, mathematics, science, commercial education, home economics, industrial arts, music, health, and physical education; helpful books dealing with high-school curriculum problems.

EXPERIMENTAL STUDIES REPORTED IN CURRENT ISSUES OF OTHER MAGAZINES

EDUCATIONAL ADMINISTRATION AND SUPERVISION

BRAUN, FRITZ. "*The Influence of School-Entrance-Age Upon School Performance.*" (Von Einfluss des Schulalters auf die Schulleistung) *Archiv fuer die gesamte Psychologie*, Vol. 70-1, 2, (1929).

Two hundred forty-six pupils in one instance are divided into two groups and in another into three groups, according to a low or high, or low, average, and high, school-entrance-ages. The relation of entrance age to marks for elementary school subjects is studied.

Older pupils, on the average, show a better performance than younger pupils. The influence of school entrance age is of different magnitude in different subjects. The influence is strongest in the lower age group in the so-called skilled subjects (singing and penmanship). There is practically no influence found from the entrance age in arithmetic, especially in the lower grades. The influence of school entrance age upon performance appears to be greatest in the third grade. It diminishes from grades 4 to 7.

JORDAN, FLOYD. "A Study of Personal and Social Traits in Relation to High-School Teaching," *The Journal of Educational Sociology*, iii, (September, 1929) 27-43.

A consensus of judgment of 150 high-school seniors, 120 teachers, 100 supervisors, and 100 school patrons on the importance of certain personal and social traits in relation to high-school teaching. The fifteen most frequently used descriptive terms were: intelligent, fair, broad-minded, tactful, patient, interesting, coöperative, encouraging, prompt, enthusiastic, healthy, neat, forceful, progressive, and high ideals of conduct.

LOOMIS, A. K. "Some Results of the Elective System in the High Schools of Denver," *The School Review*, xxxvii, (September, 1929), 510-518.

The author found in this study some of the results of the elective system in the high schools of Denver: that 214 different combinations of subject groups of two or more units each were completed; that the most common combination consisted of English, foreign language, social science, mathematics, and science. This combination was completed by 903, or 31 percent, of the graduates. The median number of units completed in English is 3.8; in foreign language, 2.8; in mathematics, 2.7; in social science, 2.6; in science, 2.4; in commerce, 1.3; in home economics (girls only), 1.0; in physical education, 0.7; in art, 0.6; in music, 0.5; and in industrial arts (boys only), 0.4.

MEAD, CYRUS D. "A Score Card for Rating Primary Readers," *Educational Administration and Supervision*, xv, (September, 1929), 427-430.

The author presents a score card for primary readers based upon analysis of the investigations relating to reading presented in Gray's Summary, Supplementary Educational Monograph, No. 28, Department of Education, University of Chicago. The main divisions of the score card are: objectives, hygienic features, materials, vocabulary, and pupil and teacher helps.

PSYCHOLOGY OF LEARNING

BISCHLER, W. "Des Idées Générales," *Archives de Psychologie*, xxi, (Janv.-Juin, 1929), 320-353.

A study of concept formation. After presenting a critical historical review of different theories of concept formation, the author presents results from a series of four experiments approaching concept formation through the use of classification tests. From the evidence presented the author feels that no one explanation is adequate, many different factors contributing to concept formation. An extended bibliography of French, German, and English titles is given.

CUFF, NOEL B. "The Law of Use," *The Journal of Educational Psychology*, xx, (September, 1929), 438-447.

An effort to test objectively Ebbinghaus's statement that each repetition after learning has practically the same effect. Seventy-five students took eighteen tests each. The author concludes that there is no definite ratio between the number of readings and the saving of work made possible thereby.

STODDARD, GEORGE D. "An Experiment in Verbal Learning," *The Journal of Education Psychology*, xx, (September, 1929), 452-457.

This study reports findings concerning the learning of French equivalents. Wherever the translation of French words is the important consideration, the learning order should be from French to English.

EXPERIMENTAL STUDIES OF TEACHING

BOOK, WILLIAM F. "How a Special Disability in Spelling was Diagnosed and Corrected," *The Journal of Applied Psychology*, xiii, (August, 1929), 378-393.

A discussion of how an unusually bright twelve-year-old boy learned to overcome a special disability in spelling. The set of directions given to the learner for the study of spelling is reproduced in full, and should be of especial assistance to teachers desiring to handle cases of disabilities in this subject.

GUILER, WALTER SCRIBNER. "Improving Handwriting Ability," *The Elementary School Journal*, xxx, (September, 1929), 56-62.

The author describes a procedure for improving handwriting based upon individual diagnosis and remedial instruction.

SIBLEY, MARTHA. "Individual Reading Method Adapted to the Grade Readers for Work Type Reading," *Educational Administration and Supervision*, xv, (September, 1929), 441-447.

A study of the effectiveness of an individualized method of teaching. The author described the procedure used in diagnosing children's difficulties, the plan of grouping children according to outstanding weaknesses, the selection of materials to be read, practice and test exercises, the teaching procedure, and the results secured from the application of standardized tests. In terms of these results, the procedure seemed to be effective.

EDUCATIONAL AND VOCATIONAL GUIDANCE

HETZER, HILDEGARD. "Introduction of the Child and Adolescent into Family and Society." (Die Eingliederung des Kindes und Jugendlichen in Familie und Gesellschaft) *Pädagogische Warte*, No. 14, (July, 1929), 637-644.

A survey of child researches from the Psychological Institute of the University of Vienna.

The pre-social period of child life ends during the second month. Thereafter, the child begins to show positive social reactions, one of the first to be displayed is "smiling." From the time that the child distinguishes between human beings and other objects of his environment, there exists a subjective urge for social contact. The different forms of social contact and reactions are genetically presented. Some of the more important ones are the phase of "stubbornness", which reaches its climax during the third year, and the period of "protest against authority" and the "negative phase" or period of isolation through which boys pass at 15 and girls at 13, and which lasts from two to nine months. After the last named period the social contacts pass from group contacts to "twoer"—relationships. A bibliography of 35 related titles is given.

KAULFERS, WALTER. "Value of English Marks in Predicting Foreign-Language Achievement," *The School Review*, XXXVII, (September, 1929), 541-546.

The coefficients indicate that teachers' estimates of pupil achievement in English are more accurate measures of probable success in foreign language than are intelligence quotients, end-semester marks in general language, and scores on standardized foreign-language aptitude tests.

SHUTTLEWORTH, FRANK K. "Environmental Character Factors Involved in Scholastic Success: 1926-1927 Data," *The Journal of Educational Psychology*, XX, (September, 1929), 424-433.

A study of the predictive value of a carefully devised information blank as compared with tests in reading comprehension, English aptitude, English training, and a high-school content examination. The information blank yielded substantial correlations with grade points.

INTELLIGENCE TESTING

SANGREN, PAUL V. "Comparative Validity of Primary Intelligence Tests," *The Journal of Applied Psychology*, XIII, (August, 1929), 394-412.

A comparative study of eight frequently used primary intelligence tests. The author lists the tests in order of their approximate comparative validity as follows:

1. Haggerty Intelligence Examination, Delta I
2. Pressey Primary Classification Scale, Form A
3. Pintner-Cunningham Primary Mental Test, Form A
4. Detroit First Grade Intelligence Test, Form A
5. Otis Primary Mental Examination, Form A
6. Kingsbury Primary Intelligence Scale, Form A
7. Rhode Island Intelligence Test, Form A.

SIRKIN, M. "The Relation Between Intelligence, Age and Home Environment of Elementary School Pupils," *School and Society*, XXX, (August 31, 1929), 304-308.

This investigation shows that there is a correlation of .40 between social status and intelligence scores of pupils belonging to the same school grade and having the same formal school training.

EDUCATIONAL TESTS AND MEASUREMENTS

DUNLAP, JACK W., DE MELLO, ADRIAN, AND CURETON, EDWARD E. "The Ef-

fects of Different Directions and Scoring Methods on the Reliability of a True-False Test," *School and Society*, xxx, (September 14, 1929), 378-382.

Reliabilities, means, and standard deviations are presented for true-false tests given under different conditions.

NOLL, VICTOR H. "The Measurement of Achievement in General Inorganic Chemistry," *The Journal of Educational Psychology*, xx, (September, 1929), 458-465.

At the end of the second semester of instruction in general inorganic chemistry at the University of Minnesota, a group of 54 students were given a comprehensive, objective examination. The author presents an analysis of the results of this test.

STATISTICS

DOUGLASS, HARL R. "A Note on the Correctness of Certain Error Formulas," *The Journal of Educational Psychology*, xx, (September, 1929), 434-437.

A discussion of the Shen and the Holzinger-Clayton formulae for the standard error of the coefficient of correlation.

MAY, MARK A. "A Method for Correcting Coefficients of Correlations for Heterogeneity in the Data," *The Journal of Educational Psychology*, xx, (September, 1929), 417-423.

In most statistical data there are two kinds of heterogeneity, the first resulting from errors of measurement, the second resulting from errors of sampling. The author discusses the several formulae applicable to this situation.

TRYON, ROBERT CHOATE. "The Interpretation of the Correlation Coefficient," *Psychological Review*, xxxvi, (September, 1929), 419-445.

The author summarizes the works of Kelley, Nygaard, Spearman, Hull, and Wright on the interpretation of the correlation coefficient, and produced additional illustration and formulae. The interpretation is technical in character but valuable.

CURRICULUM RESEARCH

ASHBAUGH, E. J. "Adjectives Used by High-School Students," *Educational Research Bulletin*, Ohio State University, viii, (September 11, 1929), 273-275.

The data presented are based upon an analysis of 100 letters written by girls in each Grade VII to XII inclusive. The sum total of running words in these six hundred letters analyzed was 161,640 and included nearly 6,000 different words. Eighty-three adjectives were used five or more times by writers in one or more of the different grades. Eighty of these 83 adjectives were in the positive degree. The ten most frequently used adjectives with frequency of usage were: good, 337; last, 257; new, 181; glad, 164; next, 160; nice, 134; big, 115; little, 111; long, 105; fine, 91.

BAKER, ELIZABETH W. "A Social Basis for the Teaching of Elementary English Language," *The Elementary School Journal*, xxx, (September, 1929), 27-33.

A study of the uses of spoken English listing the various cases of activities engaged in by children from grades three to seven.

BUCKINGHAM, B. R. "How Much Number Do Children Know," *Educational Research Bulletin*, Ohio State University, viii, (September 11, 1929), 279-284.

A study of the number abilities of 1,356 first-grade children based upon an interview test of six parts, the first two of which concerned themselves with counting, the next two with number concepts, and the last two with number combinations. This test was given during the first two weeks of school and before systematic instruction in number had started. Ninety percent of these children could count to ten; twenty-five percent of them could count by tens to 100; practically all of the children were able to reproduce the numbers from one to four; forty-two percent of them succeeded in naming and identifying an unnamed number of objects; seventy-two percent gave correctly the combination five plus one, and these percents varied to twenty-two percent who gave correctly the combination four plus five. These 1,356 children gave a surprisingly good account of themselves.

PRESCOTT, DANIEL ALFRED. "Le Vocabulaire des Manuels de Lecture," *Archives de Psychologie*, xxi, (Janv.-Juin, 1929), 262-274.

An analysis of seven readers used in the canton of Genève and in France with the primary purpose to illustrate the method of analysis in common use in the United States. The vocabularies of the readers studied were found to be too extensive and too difficult for the ages for which they were intended.

PRESCOTT, DANIEL ALFRED. "Le Vocabulaire des Enfants des Écoles Primaries de Genève," *Archives de Psychologie*, xxi, (Janv.-Juin, 1929), 225-261.

A study of the vocabularies of primary school children of the city schools of Genève conducted by the Institute of the Science of Education, of the University of Genève. The free association method was used. Each child was asked to write for 15 minutes. One hundred children for each age group, seven to fourteen, were studied. The data show a definite and regular increase in the vocabulary of school children for those ages up to thirteen. The vocabulary for each age group was compared with that of Henmon's, *French Word Book*, and a continuous increase in the percentage of words found in the Henmon list was reported. The entire list of words is reproduced with the frequency of occurrence for boys and girls, and in the Henmon word list and the corresponding ages given in A. Descoendres' *Le Developpement de l' enfant de 2 à 7 ans.*

GOODENOUGH, FLORENCE L. "The Emotional Behavior of Young Children During Mental Tests," *The Journal of Juvenile Research*. xiii, (July, 1929), 204-219.

Three traits or aspects of the emotional behavior of 990 children each of whom was given one to five mental tests at the University of Minnesota Institute of Child Welfare were studied. These traits were *shyness, negativism,* and *distractibility*. By the use of a series of descriptive categories, it was found possible to classify the behavior of young children during the giving of mental tests in an objective manner. The author reports a decided improvement in behavior with increase in age. The mean shyness of boys in the lower social groups is less than for upper social groups, and "only" children somewhat less shy and very much more distractible than children coming from families of more than one child. Children of the upper social classes were rated more negativistic and more distractible than those of lower classes.

OATES, DAVID W. "Left-handedness in Relation to Speech Defects, Intelligence, and Achievement," *The Forum of Education.* vii, (June, 1929), 91-105.

The subjects of the investigation were 4,176 boys, nine to eighteen years of age, attending secondary, central, and elementary schools. Among other things the author concludes that, if we neglect the dominant eye test and analysis types of handedness, there is a higher percentage of speech defects among left-handed than among right-handed children, the proportion being four to one. Speech defects are six times as frequent in the mixed handedness groups as in the pure handedness groups. Nervous disability is two and a half times as frequent in the "crossed" groups as in the "pure" groups.

RESEARCH NEWS and COMMUNICATIONS

Address all research news and communications to Editor V. T. Thayer, Ethical Culture Schools, 33 Central Park West, New York City.

A distinctive characteristic of research in education as of research in other fields is its dependence upon the coöperative activity of many minds. Frequently the definition of a research problem is aided and the conduct of an investigation stimulated by the knowledge of undertakings others are contemplating, as well as by what others have done. The *Journal of Educational Research* wishes to aid its readers by functioning as a clearing house of information on matters of research in education. To do this effectively we must receive news items and communications from the field.

It will be observed that the name of this department has been changed from *News and Communications* to *Research News and Communications*. This change stresses the fact that the department will concentrate upon items of news and communications of interest to research workers rather than upon items of a purely personal character. We wish to carry information regarding research and its applications that are in progress. We wish also to call attention to plans and projects in process of formulation. We solicit the assistance of all those interested in the realization of this purpose. Here as elsewhere we can observe with profit the motto of The Three Musketeers,

"Tous pour un, un pour tous."

Dr. J. E. W. Wallin, formerly professor of Clinical Psychology and director of the Bureau of Special Education and Psycho-Educational Clinic in Miami University, has been appointed director of the recently created division of Special Education of the city of Baltimore to have charge of all special classes for mentally and physically handicapped children. Dr. Wallin will also offer classes in Johns Hopkins University in the field of Special Education.

The Department of Educational Research of the Colorado State Teachers College, Greeley, Colorado, has issued a bulletin summarizing the "Research activities at Colorado State Teachers College for the college year, June, 1928 to June, 1929." A brief abstract is given of each study.

The annual report, 1928-'29, of the Burnham Public Schools, Burnham, Pa., contains an analysis of enrollment attendance, promotions and failures, standard test scores, with graphs and comparative data. Burnham is a city of 3000 population. The report is mimeographed.

The Division of Research and Surveys of the Connecticut State Board of Education, Hartford, Connecticut, has issued a series of three Research Letters on "Teachers' Salaries, 1928-1929"; "Current Expenses Per Pupil In Average Daily Attendance, 1927-1928"; and the "Percentage of Local Tax Receipts Devoted to Schools." These communications are addressed to superintendents, supervising agents,

acting school visitors and chairmen of Town School committees, and they attempt to furnish reliable data upon the topics discussed.

The June issue of the *Baltimore Bulletin of Education*, Baltimore, Md., contains a discussion of the work of the *experimental centers* conducted in certain elementary schools of the Baltimore Public Schools. This discussion seems to center around the development of unit work. Stenquist, in an editorial, points out that "learning is always an active process" and Caldwell of the Institute of School Experimentation, Columbia University, discusses the importance and place of unit work in the elementary school. There are other articles reviewing the work of experimental centers in particular grades and subjects.

The Bureau of Research, Albany, New York, which was established last fall (September, 1928), has issued during the past year a series of mimeographed reports, graphs, etc., covering a survey of grading in the Albany Public School System. These bulletins lay the basis for a new grading system and a grouping within grades.

The June issue of *Newark School Bulletin* contains a summary of reports on City-wide Tests in arithmetic. Newark pupils find common fractions much more difficult than decimal fractions; and subtraction easier than division.

Abbreviations in Language Textbooks

The avowed aim of teaching language in the elementary school is to train the student to use written and oral English with ability and ease. In spite of this general agreement as to aim, the variation in specific skills and objectives presented in the various language textbooks is amazing. For instance, in the case of punctuation, the hyphen and semicolon are presented in some textbooks and omitted entirely in others. Sentence form is an objective in some texts, although it is not mentioned in others. Enunciation is presented in a few texts and omitted in others. There are many differences in the presentation of vocabulary in the various texts.

The abbreviation skills presented in modern textbooks also vary widely. In order to determine the extent of this variation, thirty grade texts in seven sets of language books copyrighted between 1921 and 1928 inclusive were inspected. The number of texts studied for each grade is indicated in Table I. Six third-grade texts, seven fourth-grade texts, etc., were studied.

In the thirty grade texts used in grades three to eight inclusive, sixty-nine abbreviation skills were found. These skills ranged from simple terms such as "Mr." and "Dr." to the more complex skills such as abbreviations for countries and dictionary abbreviations. Table I presents only the abbreviations which are found in five or more of the thirty grade texts. It is read as follows: "Ave." is found in one out of six texts for the third grade, in three out of seven texts for the fourth grade, in none of five texts for the fifth grade, in one out of five texts for the sixth grade, in one out of four texts for the seventh grade, and in none of the three for the eighth grade. Most common abbreviations are "Mr." and "Mrs." found in fifteen texts, listed in three out of six books for the third grade, in six out of seven books for the fourth, in two out of five books for the fifth, in two out

TABLE I

Grade	3rd.	4th.	5th.	6th.	7th.	8th.	Total
Number of Texts studied for each Grade	6	7	5	5	4	3	30
Abbreviations							
Ave.	1	3		1	1		6
a. m. and p. m.		1	3	2		1	7
Co.	1	1	2	2			6
Of days of the week	1	2		1	1		5
Dr.	1	4	3	2	1	1	12
Hon.		3	1	1			5
Of months	1	4	2	1		1	9
Mr. and Mrs.	3	6	2	2	2		15
Rev.	1	1	2	1	1		6
R. F. D.	1	3	2		1		7
St.	1	4	1	2			8
Of States	1	3	1	1	1	1	7

of five books for the sixth, in two out of four books for the seventh, and in none of the three books for the eighth. "Dr." is found twelve times, etc. Abbreviations for the months are found in nine of the grade texts and "St." is found in eight texts studied.

No term is presented in all the texts of any one grade, although "Mr." and "Mrs." are found in six out of seven texts in the fourth grade. "Dr." is found in three out of five fifth-grade texts. Many terms such as "in.", "ft.", "yd.", "mi.", "P.S.", "R. R.", "&", "doz." and "anon." are found in only one text for one grade. Forty-five of the sixty-nine skills are found in texts for one or two grades, and not in any texts for the other four or five grades.

Few of the abbreviations are presented early. Thirteen appear in the third-grade texts; thirteen more are presented in the fourth grade, but only two of those presented in the third are not carried over into the fourth. Many of the abbreviations are presented to the upper grades. "Anon." "ans." "amt." "A." are found in one eighth-grade textbook out of the thirty texts studied. "Cnts." and abbreviations of parts of speech are found in only one seventh-grade book. "Esq." and "i. e." are found in one sixth-grade text. Only eleven of the abbreviations appear in books for four or more of the grades.

It is not the purpose of this communication to show at this time what specific abbreviations should be taught, nor to show where they should be taught. Such a study will take years of careful research. The only purpose is to point out the great lack of uniformity in presentation of abbreviations in the various texts, not only in regard to the skills presented, but also as to the time and place of presentation. Undoubtedly, authorities are not agreed as to the answers to these problems. The field of language is evidently a rich one for research.

In summary it may be said that:

(1) Abbreviation skills are presented and taught with no apparent regularity in the textbooks studied.

(2) There is but little consistency in grade location of abbreviations in the textbooks.

(3) There is little agreement as to the most important and useful abbreviations; many abbreviations are found in merely one or two texts for one or two grades.

(4) Only eleven, of the sixty-nine different abbreviations tabulated, are presented to four or more of the grades.

(5) The fourth grade seems to be the most popular grade for the presen-

tation of abbreviations that are taught consistently.

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A STANDARIZED TEST IN MODERN LANGUAGES[1]

The aim of this study has been to make a test which would measure the French student at any point during his first two years of learning.

The test, in its final form comprises three sections: vocabulary, grammar and comprehension. The vocabulary test contains one hundred French words. Each word is followed by five English words one of which is the equivalent of the French word. Each of these five English words is num-

[1] Sammartino-Krause Standard French Test, Bloomington, Ill., Public School Publishing Company.

TABLE I

DISTRIBUTION OF SCORES ON THE VOCABULARY TEST BY SEMESTERS

	First	Second	Third	Fourth	Fifth
95-100			11	13	17
90-94	1	1	31	22	19
85-89	1	15	43	13	3
80-84		17	10	8	
75-79	3	42	19	5	
70-74	7	39	3	1	
65-69	8	26	2	0	
60-64	13	15	0	2	
55-59	22	12		0	
50-54	26	6		0	
45-49	33	4		1	
40-44	33				
35-39	30				
30-34	17				
25-29	15				
20-24	4				
15-19	0				
10-14	2				
Total	215	177	119	65	39
Q1	55.18	76.9	91.98	94.26	97.13
Median	45.91	73.4	87.95	90.57	94.15
Q3	37.5	66.39	82.88	84.53	91.78

TABLE II

DISTRIBUTION OF SCORES ON THE GRAMMAR TEST BY SEMESTERS

	First	Second	Third	Fourth	Fifth
95-100			1	2	2
90-94			1	2	2
85-89			9	6	8
80-84			13	12	12
75-79		1	20	11	10
70-74		5	18	5	3
65-69	1	4	27	12	4
60-64	3	12	14	6	1
55-59	5	19	10	5	
50-54	6	23	4	4	
49-45	9	27	2	2	
40-44	23	27	3		
35-39	14	27	2		
30-34	20	9			
25-29	42	16			
20-24	34	5			
15-19	28	1			
10-14	16	0			
5-9	12	1			
0-4	6				
Total	219	177	124	65	42
Q1	37.24	54.29	78.06	81.56	95.00
Median	26.67	45.65	70.00	73.50	80.00
Q3	16.29	37.27	63.48	64.38	76.00

TABLE III

DISTRIBUTION OF SCORES ON THE COMPREHENSION TEST

	First	Second	Third	Fourth	Fifth
95-100		7	23	15	26
90-94	3	14	22	8	7
85-89	2	21	22	9	4
80-84	6	44	25	21	2
75-79	12	27	6	4	
70-74	14	24	7	1	
65-69	14	11	3	2	
60-64	32	6	3	1	
55-59	19	1	1		
50-54	23	4			
45-49	19	0			
40-44	39	1			
35-39	10				
30-34	12				
25-29	5				
20-24	5				
15-19	1				
10-14	2				
5-9	0				
Totals	218	160	112	61	39
Q1	63.66	85.48	93.86	94.84	98.20
Median	53.37	80.68	87.50	85.83	96.25
Q3	42.40	73.54	81.60	81.72	92.68

bered 1, 2, 3, 4 and 5. The pupil is to decide which English word comes nearest in meaning to the French word and to put the number of the English word in the parentheses at the right of the line. This method permits easy scoring by the teacher or even by a pupil, since no knowledge of subject matter is needed.

The words used in this test were picked from nine standard textbooks in French. These words were then checked on Henmon's *French Word Book* which gives the frequency of words used in 400,000 French running words. They were also checked on Ward's *Minimum French Vocabulary Textbook* and on Wood's *Comparative Study of the Vocabularies of Sixteen French Textbooks.*

In preliminary tests which were given to almost a thousand pupils at Jamaica High School, the difficulty of each word was found out and the words were rearranged in the order of difficulty. Words which proved themselves to be too easy, that is, if they were done correctly by 90 percent or more of the first term pupils, were eliminated from the test.

The grammar section of the test contains fifty items. Each item is designed to test some grammatical point. The English sentence is given first. Then follows the French translation of the English sentence, with the particular word, designed to test the grammatical point involved, left out. In place of the word there are three small dashes to indicate the omission of a word or a number of words, but the space is not large enough to permit the pupil to write the word or words in the space. At the end of the line, at the extreme right, there is a line where the pupil is to write the word or words to complete the French sentences.

This section of the test is also very easy to score, since the answers are underneath each other and can be quickly scored with the key provided.

The grammatical items were derived from nine French textbooks and each item is common to all of these books. In fact, it is doubtful whether there are any textbooks which do not cover all the items tested. The words used in the sentences are all very easy and known to first term pupils.

The last part of the test, the comprehension test, consists of five selections in French. Each selection is followed by five questions in English to be answered in English. The answer is to be as brief as possible, perhaps a word or a phrase. Again the physical arrangement has been with an eye to facilitate scoring.

English is used in the questioning and answering in order to make the test do just what it is supposed to do, test comprehension only.

No efforts were spared to make the test as valid as possible, that is, to make it measure what we wished it to measure. Every possible method of checking the choice of the material was resorted to in order that this purpose might be accomplished.

To establish its reliability, the test was divided into halves, the odd-numbered questions in one half, the even-numbered in the other half. The coefficients of correlation between the two halves are .86, .81 and .90 for the vocabulary, grammar and comprehension respectively. These figures show a fair degree of reliability.

PETER SAMMARTINO

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PROPORTIONATE DISTRIBUTION OF CURRENT EXPENDITURES IN UTAH SCHOOL SYSTEMS

Various reports and school surveys direct attention to the proportionate amounts of school expenditures devoted to the major school functions. Here are presented data showing the proportionate distribution of current expenditures in the Utah city and county-unit school districts together with the typical percent allotment of current expense in city school systems in the United States as a whole.

Table I shows the percent allotment of money expended for the six major school functions in Utah, when expenditures for all schools are considered and when expenditures for high schools and for elementary schools are considered separately.

Of all money expended for current school purposes in Utah in 1925-26, 74.7 percent was devoted to cost of instruction, 9.8 percent to operation, 5.8 percent to auxiliary agencies, 4.8 percent to general control, 4.6 percent to maintenance, and 1.0 percent to fixed charges.

On the basis of data for two recent years and in round numbers, it can be

TABLE I

PERCENTS OF TOTAL CURRENT SCHOOL EXPENDITURES DEVOTED TO MAJOR SCHOOL FUNCTIONS IN UTAH

(Data from Reports of State Superintendent of Public Instruction)

	General Control	Instruction	Operation	Maintenance	Fixed Charges	Auxiliaries
All Schools						
State Total, 1924-25	4.9	75.6	10.1	4.6	0.9	3.9
State Total, 1925-26	4.8	74.7	9.8	4.6	1.0	5.1
Avg. 5 City Dists., 1925-26	5.1	79.7	9.2	3.9	0.6	1.5
Avg. 35 County-Unit Dists., 1925-26	7.2	70.8	10.2	4.4	0.9	6.5
State Avg. 20 yrs. (1906-25)*		68.9				
High Schools						
State Total, 1924-25	4.3	72.3	10.1	4.3	1.2	7.8
State Total, 1925-26	4.6	71.5	9.1	5.1	1.1	8.6
Elementary Schools						
State Total, 1924-25	4.9	76.4	10.2	4.7	0.9	2.9
State Total, 1925-26	4.9	76.4	10.1	4.2	0.9	3.6

*Survey of Education in Utah, p. 412.

said that the Utah school dollar is expended as follows: seventy-five cents for instructional purposes, ten cents for costs of operation, five cents for auxiliary agencies, five cents for general control, four and one-half cents for maintenance costs, and one cent for fixed charges.

The distribution of the school dollar is different in the city districts from that in the consolidated districts. The cities spend a larger proportion of their total revenue for instructional purposes than do the county-unit districts. It requires about four times as large a proportion of the total school revenues to support the auxiliary agencies in the county-unit districts as it does in the cities where transportation is a minor part of the necessary school program. The proportion required for general control is also higher in the consolidated districts.

Where a larger proportion of the total school revenue is required for auxiliary agencies, it is the high schools which receive this money. It seems to require a larger proportion of the total money for these auxiliary functions in the high-school program than it does for other functions, excepting instruction and operation of the school plant, and it now requires, approximately, the same amounts of money to support these auxiliary agencies in the Utah high schools as it does to operate the high-school plant.

Operation costs consistently take about ten percent of the total school expenditure in all types of schools, whether city, county, high school, or elementary school. This fact finds confirmation in the data from the city systems of the country at large.

Maintenance costs in the Utah schools bear about the same relation to the other functional costs as prevails in the country at large. Maintenance costs in Utah schools seems to take between four and five percent of the total expenditures; and for city school systems at large, the lower and upper limits of the middle fifty percent of the cities are 2.5 percent and 5.5 percent respectively.

Table II shows The Typical Percent Allotment of Current Expenses in City School Systems. It is based upon seven hundred forty-four reports of expenditure in cities of 2,500 population to 100,000 and for over a period of eight years. In making this table no classification of cities was made, but it can be stated that the central tendencies shown in this table are not materially changed when the cities are grouped according to the amount expended per pupil in average daily attendance. Data for this statement are available but are beyond the limited scope of this article.

TABLE II

THE TYPICAL PERCENT ALLOTMENT OF CURRENT EXPENSES IN CITY SCHOOL EXPENDITURES*

	Range Percent	Middle Fifty Percent Q3	Middle Fifty Percent Q1	Median Percent	Mean Percent
Instruction	49.1–89.7	78.4	71.2	74.7	75.0
Operation	2.6–25.1	12.9	9.0	10.4	10.9
General Control	0.9–13.7	4.8	3.0	3.9	4.5
Maintenance	0 –10.2	5.5	2.5	3.8	4.2
Auxiliaries	0 –24.2	3.1	.06	1.9	2.3
Fixed Charges	0 –13.2	2.3	0.7	1.4	1.7

*Based upon 744 reports of city school expenditures. All cities of 2,500 population to 100,000 population and over reported to United States Bureau of Education at four bienniums, 1919-20 to 1925-26.

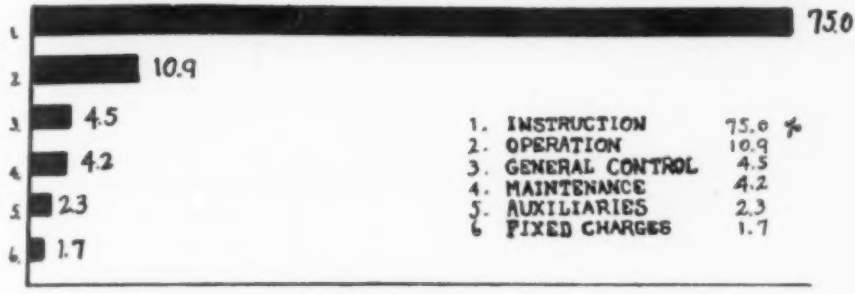

Diagram I

Per Cent of Total Current Expense Alloted to Major School Functions in The Typical City School Budget.
(Based upon 744 Reports of Cities of 2500 population to 100000 and over covering a period of 8 years.)

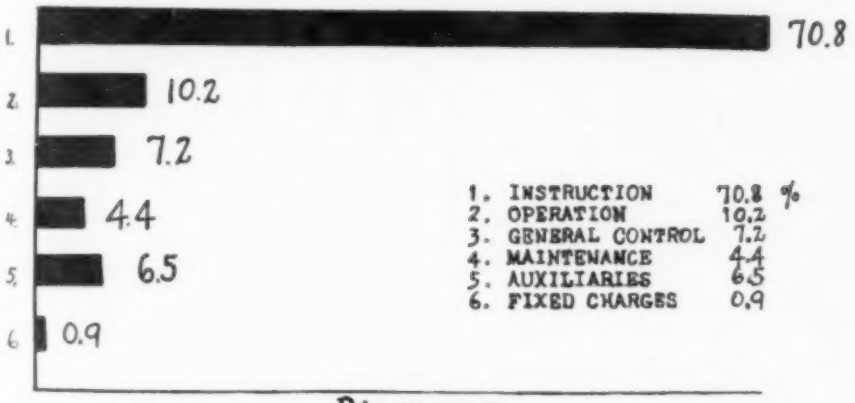

Diagram II

Per Cent of Total Current Expense Alloted to Major School Functions in The Average Utah County-Unit Budget.

The typical city school current expense budget allots seventy-five percent of the total cost to instruction, ten percent to operation, four and one-half percent to general control, four percent to maintenance, two and one-half percent to auxiliary agencies, and slightly less than two percent to fixed charges.

Practice in Utah cities conforms closely to these figures. As might be expected, practice in the county-unit districts varies from these figures, chiefly in the matter of auxiliary costs, and general control.

Figures reported in this study will be of the greatest service, if they stimulate individual school administrators to make careful analyses of unit-costs and of proportionate allotments of money, as they seek to explain or justify specific practices within their own systems.

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READING ABILITY IN SPECIAL CLASSES

The special classes for mentally retarded children in Yonkers are divided into two groups, the primary and the advanced. There is considerable overlapping in these two groups in chronological and mental age and in corresponding grade rating. Roughly speaking, however, retarded children with a mental age of eight years, or higher, are placed in the advanced group. The remainder are assigned to the primary classes. Difficulties of transportation in a crowded city make it impossible to always assign a child to the group most nearly approximating his mental level.

Seventy-nine children enrolled in six primary special classes were given a battery of educational tests at the close of the first semester of the school year, January 1928, with the purpose of ascertaining if the grade rating in the fundamental school subjects approximated the grade rating based on mental age. The subjects covered in the examination were silent reading, arithmetic computation, and spelling. The tests used for silent reading were:

Gates Primary Reading Examination
- Type 1 Word Recognition
- Type 2 Word, Phrase, and Sentence Reading
- Type 3 Directions

Haggerty Reading Examination
Sigma 1

The present article is concerned with the results obtained from the reading tests.

The children who were examined ranged in chronological age from 7 to 16 years. The range in mental age was from 4 to 10 years. The range in IQ was from .35 to .85. The following frequency tables give the exact data:

Chronological Age in years										
Years	7	8	9	10	11	12	13	14	15	16
Frequency	3	7	11	14	13	10	11	6	3	1

Median 11.35 years

Mental age distribution, based on the results obtained from the Stanford Revision of the Binet Simon tests:

Mental age in years	4	5	6	7	8	9	10
Frequency	2	9	14	34	10	9	1

Median 7.43 years

Intelligence Quotient										
IQ	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80
Frequency	1	3	1	6	9	8	26	15	5	5

Median 67.2

In order to translate the mental age ratings into the appropriate grade ratings, Table I was used in Gates' *Improvement in Reading*. (MacMillan Co., 1927). The median grade rating was found to be 1.937, with fifteen children falling within kindergarten level, twenty-seven in grade 1, twenty-four in grade 2, eleven in grade 3, and two in grade 4. The above facts show why it is usually necessary for a

teacher, in any given special class, to divide her class into three and sometimes four groups for instruction in the academic subjects.

Test 1 in Gates' Primary Examination is concerned with word recognition, Test 2 with phrase and sentence reading, and Test 3 with the reading of directions. By the use of Tables II, III, IV (Gates' *Improvement in Reading*), the raw score for each test was converted into a reading age score and the average reading age computed for each test.

The results were as follows:

	Av. Reading Age	A.D.
Gates 1 Word recognition...	7.99	.92
Gates 2 Phrase.	7.97	.90
Gates 3 Directions.	7.78	.74
Gates Combined 1, 2, 3....	7.91	.88

One might expect that subnormal children would score considerably lower in the reading of sentences and directions than in word recognition, but such did not prove to be the case. The correlations of the raw scores in Gates 3 and Haggerty Sigma 1 was .89 ± .02.

The following correlations were also obtained:

Stanford Binet M.A. Gates 1 Reading Age.....	r	.58±.06
Stanford Binet M.A. Gates 2 Reading Age.....	r	.61±.05
Stanford Binet M.A. Gates 3 Reading Age.....	r	.58±.06
Stanford Binet M.A. Av. Reading Age on Gates 1, 2, 3 Combined.....	r	.64±.04

The average reading age for each child was found by averaging the three reading ages which he made on the three Gates tests. The difference in years was then found between the child's combined reading age and his actual mental age as determined by the Stanford Binet Test. The table given below shows that 74.8 percent of the total group reached or exceeded the reading age corresponding to their mental age by 0 to 3.4 years. Twenty-five percent of the total group ranged from .1 to 2.4 reading years below their mental age.

Difference in teaching skill partly accounts for these wide variations. Other factors, such as the length of time which the pupil had been in the special class, physical handicaps as, for example, chorea or cardiac trouble, and, in one or two cases, special disability in reading, lowered the scores of individual pupils. The average variation of the reading age below the mental age for each class is shown in the following table:

	No. of pupils below mental age rating	Av. variation in reading age
Class 1	1	.1 years
Class 2.	3	1.2 years
Class 3.	5	.5 years
Class 4.	6	1.0 years
Class 5.	4	.6 years
Class 6.	3	.3 years

Frequency table showing difference in years between the Stanford Binet M.A. and Reading age computed from Gates 1, 2, 3 combined reading ages:

Difference in years	Frequency	Percent
3.0–3.4.	1	1.2%
2.5–2.9.	2	2.4%
2 –2.4.	8	9.6%
1.5–1.9.	21	25.2%
1 –1.4.	14	16.8%
.5– .9.	10	12.0%
0	2	2.4%
–.1– .4.	7	8.4%
–.5– .9.	7	8.4%
–1 –1.4.	4	4.8%
–1.5–1.9.	2	2.4%
–2 –2.4.	1	1.2%

The fact that 74.8 percent of the seventy-nine children enrolled in the special classes were achieving up to and above their mental level is very encouraging. In spite of the fact that more than one-fourth of the school day is devoted to industrial activities, the individual attention which the teachers in the special classes can give to the needs of the handicaped child produces gratifying results. Some research workers in the study of subnormal children have asserted that in the aca-

demic subjects the special classes fall far below their mental age rating. Taking into consideration the variations in teaching ability and making allowance for miscellaneous factors, as stated above, our data seem to indicate that in the primary special classes, at least, the reading age closely approximates the mental age level.

ANNETTE BENNETT
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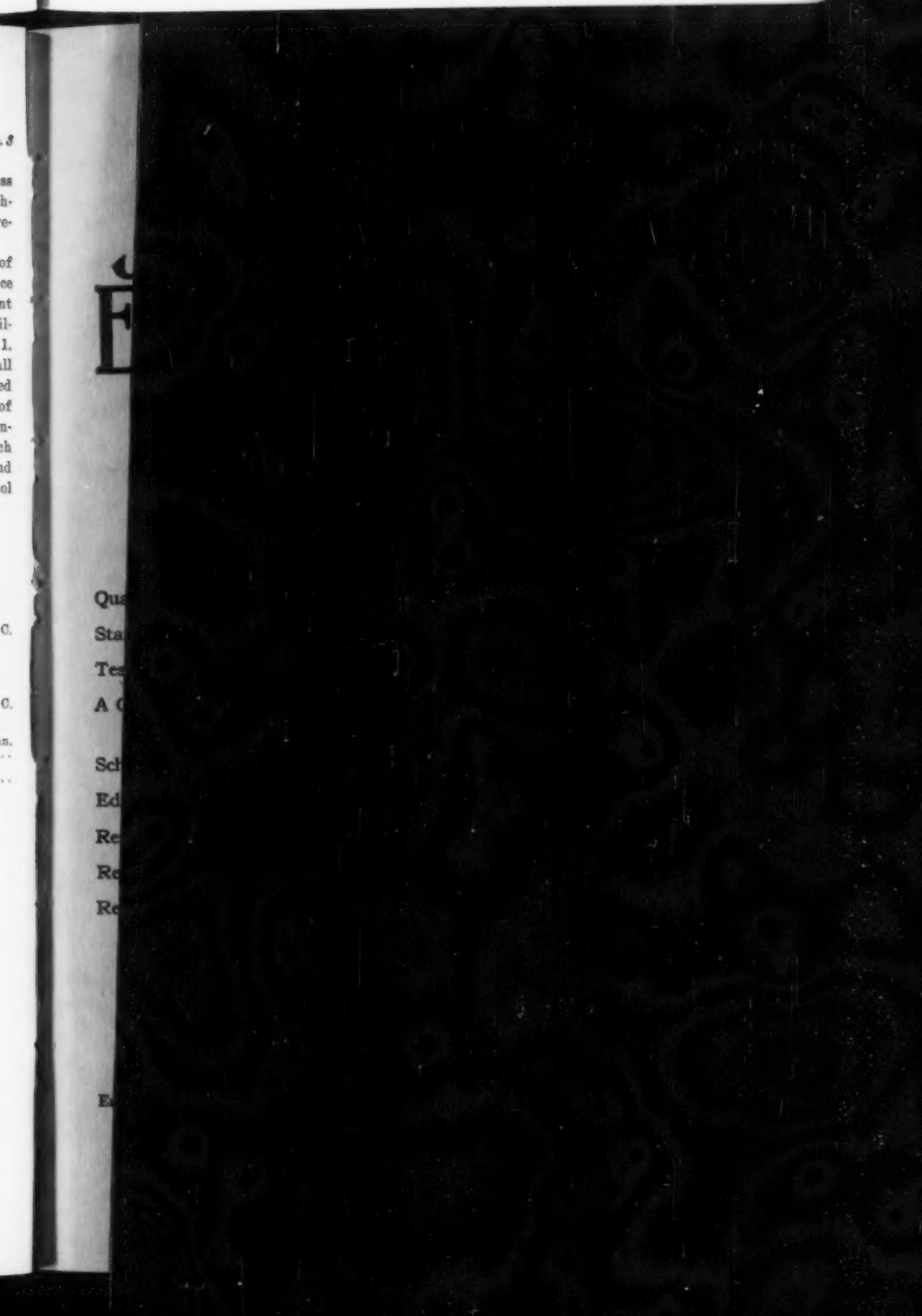
Miss Velma Jones, Effingham, Ill., was kind enough to forward to the *Journal of Educational Research* a list of National Service Organizations for girls, which she compiled in the process of a recent investigation at Northwestern University. The list is reproduced below.

Dr. Landis Tanger, superintendent of Reading, Pennsylvania schools since 1922 assumed the duties as President of the State Teachers College at Millersville, Pennsylvania, September 1. He has had experience covering all types of public school work. He served on the Committee of the Survey of Normal Schools in the State of Pennsylvania in 1924, and, has had much to do with revision of curricula and vocational training in public school systems.

NATIONAL ORGANIZATIONS FOR GIRLS*

1.	Am. School Citizenship League	405 Marlboro St.	Boston, Mass.
2.	Audubon Club	1974 Broadway	New York City
3.	Blue Birds	31 East 17th St.	New York City
4.	Camp Fire Girls	31 East 17th St.	New York City
5.	Carroll Club	120 Madison Ave.	New York City
6.	4-H Club	Extension Service, U. S. Dept. Agri.	Washington, D. C.
7.	Girls' Friendly Society	15 East 40th St.	New York City
8.	Girls' Service League	138 East 19th St.	New York City
9.	Girl Scouts, Inc.	670 Lexington Ave.	New York City
10.	Girl Reserves	600 Lexington Ave.	New York City
11.	Inkowa Club	4 West 40th St.	New York City
12.	Junior Red Cross		Washington, D. C.
13.	Junior Achievement Club	33 Pearl St.	Springfield, Mass.
14.	King's Sons and Daughters	250 Park Ave.	New York City
15.	Ladies of the Golden Eagle	814 Broad St.	Philadelphia, Penn.
16.	Life-Saving Guards	Salvation Army Headquarters	
17.	Pioneer Youth of America	3 West 16th St.	New York City
18.	Sunbeam Brigade	Salvation Army Headquarters	
19.	Woodcraft League of Am., Inc.	1043 Grand Central Terminal Bldg.	New York City

*Some of these include boys also in their programs.